

COASTAL ZONE
INFORMATION CENTER

Illinois City of Chicago Dept. of Development and Planning

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1977

LAKE MICHIGAN INFORMATION SYMPOSIUM



OCTOBER 11-12, 1977

PROCEEDINGS



CITY OF CHICAGO

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Illinois. City of Chicago. Dept. of Development and Planning

PREFACE

The purpose of the Lake Michigan Information Symposium was to provide a forum for researchers, bureaucrats, and information specialists to discuss the desirability and feasibility of improving the accessibility of environmental information about the southern basin of Lake Michigan. The total attendance of fifty-three participants included twelve representatives of federal agencies, fifteen from state agencies, sixteen from regional and local agencies, and ten representatives from various academic institutions.

The following pages contain the complete proceedings of the symposium, including formal presentations by representatives for three groups of interests, findings of group discussions, and the texts of two special presentations. Also included is a section which summarizes and highlights the major points covered in the discussions of these diverse interests.

The effort involved in organizing the symposium and in preparing its proceedings was made worthwhile by the enthusiasm of the attendees. The general positive comments made by the diverse group of interests represented at the symposium reinforced the desirability and value of such meetings.

It is hoped that these proceedings will prove informative and useful to many.



Russell Davenport, Chairman
of the Symposium and Editor
of the Proceedings

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SETTING THE PERSPECTIVE

Russell Davenport

City of Chicago

Good morning ladies and gentlemen. My name is Russell Davenport and I am a Coastal Resource Analyst with the City of Chicago's Department of Development and Planning. I welcome you on behalf of the City of Chicago to what I hope will be a two-day session of very intensive and worthwhile work. I would also like to gratefully acknowledge financial assistance and help in other forms from the Illinois Division of Water Resources, who administers the Illinois Coastal Zone Management Program, as well as the U.S. Office of Coastal Zone Management who have supported our Urban Lakefront Demonstration Project under which this symposium is being held.

Before we hear from our speakers I would like to briefly describe why this symposium has been convened and to delimit what we will be focusing on over the next two days.

It was our experience in putting together an Environmental Information Directory about the southern basin of Lake Michigan that a very substantial body environmental information exists. In some cases this information is easy to locate and to access. However, in many other cases this information is extremely difficult to locate and even harder to access. We also met and talked with many people who suffered from the same frustrations. We then came to the conclusion that to better understand the Lake, both as a natural resource and as a natural environment, with the limited resources available to us and to others prescribed the need to establish ways and means of facilitating access to available information. That is the purpose of this symposium.

As we proceed with our deliberations over the next two days it will be very important to keep this purpose in mind. It will be very easy to digress into subject areas that are somewhat aligned to this purpose, such as the status of Lake Michigan as a natural environment. Although this is a very worthwhile subject, it is beyond the scope of this symposium as it has been defined. What we would hope to accomplish during the next two days is to get a feel for, and maybe even some concrete recommendations for, some type of mechanism (or combination of mechanisms) to improve the accessibility of the information that is already out there and that which is being generated anew in the future.

This symposium has been organized into two major sessions. During today's session there will be a series of presentations made by representatives of the information, research, and resource management communities discussing their various experiences in obtaining and using information. Tomorrow's session will be organized into small group discussions to brainstorm some possible solutions. Some of these solutions might be institutionalized while others might be in the form of informal interactions among specific participants with common interests.

Feedback forms have been prepared to assist you in making your suggestions. The form to fill out for the first day deals primarily with user needs. Please use the form to list needs that you or your organization might have that do not get discussed during today's deliberations. The second day's feedback deals with how to improve the accessibility of information and your suggestions there would be very helpful. You are all participants in this symposium and its success or failure will be because of your interaction or lack of it.

SESSION

I

INFORMATION SOURCES
& SERVICES

STATE OF THE ART OF EXISTING INFORMATION SERVICES
University of Wisconsin
Barbara Arnold

Good morning. I am very pleased to be speaking to you this morning.

This symposium is concerned with information sharing and those of you present today are not by enlarge librarians. Information sharing is the very heart of special and reference librarianship. We librarians work together exchanging information about our services and resources. Given today's constraints of budgets and staffing, there isn't a library around that could exist in isolation. It is imperative that we share. There is one thing wrong with our sharing however. I think we librarians are so busy working with each other, talking with each other that we don't spend enough time talking to people in other professions, the information users, our clientel. We need to talk to more groups like this one, to share the information we have gathered about what is available and where to find it. We should do this early on so that at the start of a project or when you begin working on a problem you will think of libraries and existing information sources for the kinds of services and information you need.

I am from the UW-Madison College of Agricultural and Life Sciences Library -- Steenbock Memorial. I am in charge of the Natural Resources & Environmental Reference Center which is funded by a University foundation grant from the Gordon H. Barker Foundation. The Center's primary goal is to develop and coordinate information about the various environmental collections and information sources in Wisconsin. I have been working since August 1975 to identify environmental materials that are available on the UW-Madison campus as well as in the state agency collections in Madison. Last spring I worked with a library school student who was organizing one of the many environmental reading room collections on campus, Michael Reese. The result of this effort is: A Guide to Environmental Information in University of Wisconsin-Madison and Other Madison Area Libraries and Reading Rooms.

The Natural Resources Center also is responsible for developing a collection of unpublished materials on natural resources and the environment. This type of material is not usually collected in our regular library holdings. We tend to refer to it as fugitive and ephemeral because of its elusive nature. The collection contains about 1500 items so far, some of which were donated files and some the Center has ordered. I am using the FAMULUS computer program to index the collection. With the FAMULUS program I can generate a book catalog of the holdings, indexes to the materials and can do computer searches.

My task this morning is to present to you a summary of the kinds of services and information sources that are already available for the southern basin of Lake Michigan. I must tell you that I have spent the last two years sorting out the environmental information sources in Madison. Anything that I can share with you today will have to be cursory at best.

By quickly examining the Directory of Special Libraries and Information Centers -- Geographic Index and the United States Directory of Sources, I found that there are useful collection at the EPA Region V Library, the Shed Aquarium, Lake Michigan Federation, the Great Lakes Basin Commission Library, the Great Lakes Research.

Library in Ann Arbor, the Great Lakes Studies Center in Milwaukee, the Water Resources Reference Services in Madison, the Kalamazoo Nature Center in Michigan, and the U.S. Army Corps of Engineers. This is just to name a few.

In addition to these various collections, this region is fortunate to have several government documents depository collections. These are regional collections of publications, both general, and scientific and technical, that were generated or authorized by agencies of the federal government. At the Steenbock Memorial Library where I work, for example, we have depository collections from the Department of Agriculture, the Forest Service, the Department of the Interior, Fish and Wildlife Service, National Parks Service. There is a wealth of information and research available in these documents. They are difficult to maintain and take some learning to use effectively. Documents Librarians are usually a valuable key to these collections.

Aside from the library and information centers a growing source of information are the various computerized data bases available for literature searching. Some of these bases are available from commercial vendors and some are available from federal and state agencies. These on-line searching systems can pull together for the client a large number of bibliographic citations from a wide variety of sources. The searches take only a short time (10 to 15 minutes for most searches) and are available at a relatively modest cost. There are four large commercial vendors of on-line searching systems: Lockheed Information Systems, Systems Development Corporation or SDC, National Technical Information Service or NTIS, and Bibliographic Retrieval Services, Inc. or BRS. Each of these services have a number of data bases that are available for searches. The particular costs and coverage depends on the vendor you use and the data base you access.

DIALOG is the service available from Lockheed. It is the largest and most comprehensive collection of on-line bases. Although SDC is rapidly growing, DIALOG data bases cover a wide range of subject areas in Science Technology/Engineering, Social Sciences, and Business/Economics. The DIALOG data bases are regularly updated to include the most recent information and additional data bases are being added continually. Some of the data bases of interest to the Southern Lake Michigan Basin would be: AGRICOLA, which is the cataloging and indexing data base of the National Agricultural Library. APTIC is a comprehensive resource for air pollution. ENVIROLINE covers the world's environmental information gathered by the Environment Information Center. Pollution Abstracts is a leading source of references on pollution and its control.

ORBIT is the service available from SDC. SDC offers a lot of training help for new users. Again SDC offers a large number of bases for searching at low cost. Some of the bases offered that would be of interest are: Compendex prepared by Engineering Index, Inc., CRECORD which provides current coverage of the activities on the floor of Congress; Energyline prepared by Environment Information Center, Inc., and GeoRef a Geological Reference file.

NTIS is available through Lockheed and SDC. Literature searches are also available from NTIS. They are called NTISearches. An NTISearch provides access to 420,000 reports on completed U.S. Government Research and other analyses. The search generates research summaries approximately 250 words in length. the information included covers research projects from 1964. The cost: \$100 for up to 100 research summaries.

BRS was established in May, 1976 to provide low-cost on-line access to a set of major bibliographic data bases. These bases include Medlars, Chemical Abstracts Condensates, Biosis Previews. BRS offers subscription access. An annual subscription to BRS provides a library with a specified total number of connect hours which may be used at any time during the year to perform literature searches via on-line terminal on any of the BRS data bases.

In addition to these commercial bases there are some agency data bases that contain information of interest to people in the southern Lake Michigan Basin.

First is the USDI Water Resources Scientific Information Center or WRSIC data base. WRSIC has four information retrieval centers sponsored by the Office of Water Research and Technology. The University of Wisconsin-Madison has one of those centers called the Water Resources Information Program. This program is a joint activity of the Water Resources Center and the Wendt Engineering and Physical Sciences Library. The WRSIC data base contains over 70,000 documents that cover such things as: the nature of water, water cycle, water supply, water resource planning and water law. Average searches take between 20 and 30 minutes and print-outs of the search are mailed out within 5-7 days after the request is made.

A publication that is keyed to this data base is the Selected Water Resources Abstracts Journal and Index. This publication is available from the U.S.D.I. for government document depositories. It is also available by subscription from NTIS.

Next there are two services available from the National Oceanic and Atmospheric Administration. Environmental Data Service — ENDEX and OASIS. ENDEX contains computer-searchable descriptions of interdisciplinary files of environmental data on many levels. Specifically, ENDEX has three major parts: (1) descriptions of data collection efforts; (2) descriptions of data files (3) detailed inventories of large, commonly used files. The description lists parameters and volumes of data available, method used to measure the data, where and when data were collected, the sensors and platforms used, formats, restrictions, publications in which data can be found, whom to contact for further information and the cost of obtaining the data.

OASIS provides a computerized information retrieval services for ready reference to technical literature and to research in the environmental sciences and marine and coastal resources. It provides computerized searches of both NOAA and non-NOAA data bases containing references to technical publications. OASIS offers access to major bibliographic information files: Meteorological and Geostrophysical Abstracts; Oceanic Abstracts; Biological Abstracts; Compendex; Government Reports Announcements; Information Service in Physics, Computers and Control and Electrotechnology, AGRICOLA; and Scientifica and Technical Aerospace Reports and International Aerospace Abstracts.

One other base that I have just heard about at an Environmental Information sharing Conference in Minneapolis last month was: WATDOC. It is a data base of bibliographic Environment Canada and is accessible in English and French.

Now I would like to briefly mention some specific tools or services that should be useful in locating information on Lake Michigan or would be sources of information.

NTIS has a few other products worth mentioning. First is the Governments Reports Announcements & Index. This work contains summaries of government research.

It is published biweekly, about 60,000 new summaries are added annually and it is indexed by subject, personal and corporate authors, government contract and order numbers. It was designed for those used to working with technical information terms and sources.

Second, the Governments Reports Announcements are also available in subject oriented subscriptions. These are called the Weekly Government Abstracts. These again contain summaries of government research but in a brief and convenient form at a much lower cost. The subjects of interest for this group would be found in: Administration, Energy, Environmental Pollution & Control, and Natural Resources and Earth Sciences. The Subscription rates vary and are subject to change.

Third, is the NTIS Directory of Computerized Data Files, Software and Related Technical Reports. This is a unique guide to machine readable data files, software and related technical reports available to the public from more than 100 Federal Agencies. The directory is a bibliographic reference offering direct mail order service for items available from NTIS.

State agencies and planning commissions are also good sources of publications and information. We librarians have some problems locating and collecting their publications because of the lack of centralized responsibility for generating reports. Each organization has many different programs going on at the same time and no one office is responsible for overseeing their information generation. In addition to this fact is the other problem of document or publication control. No one agency is responsible for seeing that enough copies of a report are printed and distributed to the established depository library collections. No one office assumes responsibility for maintaining permanent copies of reports for future printing and distribution.

In Wisconsin, we have been working to overcome these problems by clarifying and publicizing our state documents depository law. The State Historical Society Library also publishes the Monthly Checklist of Government Publication, which helps in identifying those items that are missing from some collections.

The Wisconsin Department of Administration State Planning Office has issued a publication that deserves particular mention. It is the: Inventory of Wisconsin Land Resources Data. This inventory is designed to help anyone who wants to locate existing land resources data in Wisconsin. Entries describe data covering general, human, biological, earth, air, and water related resources.

Most of the data are in the form of maps or are spatially referenced so they can be mapped. If you want data on a particular subject or area, the inventory lists what is available, describes the data and lists a contact for further information. It is a very impressive cummulation. The State Planning Office needs people to use it and give back to them ideas on how the data inventory should be updated or how it can be expanded to provide more comprehensive coverage.

Environmental Education programs are not only sources of research and information, they are also a great source of student help for part time employment, for collecting data, for studies and gathering samples. At the University of Wisconsin - Madison, the Institute for Environmental Studies offers interdisciplinary education for undergraduate and graduate students. IES administers three graduate programs in Water Resources Management, in Land Resources Management, and in Environmental Monitoring.

Here in Illinois, the Illinois Institute for Environmental Quality does research under contract for the state. It is also responsible for the Environmental Information Center environmental information.

One of the Institute's major projects was to develop a computerized catalog of environmental materials available throughout the state. Their first edition contained about half the Institute's collection, as well as current titles from the State Library and the Illinois E P A Library in Springfield. The catalog is being continually updated and subsequent editions will include more material from all three collections.

Finally there are three additional library sources and tools that need mentioning. First, another agency that falls under N O A A is the Environmental Science Information Center. One office in E S I C is the E D S Great Lakes Library. This library is housed in the Federal Building in Detroit, MI. It contains an archival collection on lake levels and hydrology of the Great Lakes. The disciplines of hydrology and limnology comprise about 85% of the collection of 12,000 volumes. Library services are provided for NOAA personnel in Detroit and Ann Arbor, the location of the Great Lakes Environmental Research Laboratory established in 1974 to study the natural processes and develop an understanding of the Great Lakes.

Second is the National Sea Grant Depository. The National Sea Grant Depository is housed in the Clariborne Pell Marine Science Library at the University of Rhode Island. It was established in 1971 to ensure that materials published under the Sea Grant auspices would be available at a single location. Its collection, totalling more than 2000 items by July 1974, excluding newsletters, grows at a rate of over 500 publications annually. Materials range from publicity brochures, newsletters, film lists, directories, manuals, indexes, bibliographies and advisory reports to technical reports, these abstracts, reprints from scientific journals and other materials that report on original research.

The Depository staff publishes two very useful computer-produced indexes of its Master Files. These are the Sea Grant Publications Index, 1968 - 76, and the Sea Grant Newsletter Index, 1968 - 76. The archive or master file is the most complete collection available in the United States of publications resulting from Sea Grant Programs throughout the nation. They do have a circulating collection, with a loan period of one month.

Third is the U. S. E P A Library System. The E P A Library System consists of 28 libraries serving various regional, research centers and laboratory facilities. Each one of these libraries is well aware that access to the deluge of environmental information is vital to the EPA's goal of protecting and preserving the environment.

Currently the libraries are supported by computer systems which cover their journal and book holdings, journal check-in, circulation, document control, EPA

reports, international exchange items and specialized subject area collections. all of these computer systems except circulation can generate printed indexes, bibliographies and special reports. The same materials can be generated on computer output microfiche. Working under a special arrangement with NTIS, the EPA Library System has generated the EPA Reports Bibliography, The Quarterly Reports Bibliography and a new EPA Cumulative Bibliography.

Before I turn the podium over to somebody else, I would like to give you some information about three information sharing programs that I know are underway or are soon to be so.

First is a program dedicated to information sharing on an international level. It is the United Nations Environment Program - International Referral System. This system is conceived as a mechanism to interconnect users of environmental information with appropriate sources of such information. A user, upon addressing a query to IRS, would be given a selected listing of information sources which would most likely be able to satisfy his information needs and help him in dealing with his particular environmental problems. IRS refers users to sources of information and is not a source itself.

One product of this system is the: United States Directory of Sources compiled by the U.S. EPA in its role as National Focal Point of the UNEP IRS. This directory includes sources that were registered with the U.S. Environmental Referral Center as of September 1, 1976.

Second are environmental information sharing programs on a national level. These have been mentioned earlier in other contexts, but to reiterate, these include: NOAA's ENDEX and OASIS System, the USEPA Library System, the bibliographic system from the National Agricultural Library (AGRICOLA), and similar efforts among the National Forest Service Libraries.

Third, there are two programs in the works for our region. One that will involve the Great Lakes Basin Commission and one that involves the environmental librarians and information specialists from the Great Lakes Region.

The Great Lakes Basin Commission and the Michigan Sea Grant Program recently agreed to establish a WATER RESOURCES INFORMATION REFERRAL CENTER. This idea originated in the University of Michigan Coastal Zone Laboratory and was seen as a regional information center for the Great Lakes that would improve the coordination and delivery of information services. The Sea Grant Programs in Wisconsin, Illinois, and Minnesota will also be invited to participate.

The center should help the general public, scientists, researchers, and units of government find information about water resources in the Great Lakes Region. It would put information seekers in direct contact with a range of sources including government agencies, databases, libraries, university research centers and working experts.

Michigan Sea Grant and the Basin Commission are now seeking funds for the project from NOAA. The Center could be established as early as this fall.

The environmental librarian and information specialists program is one I am personally involved. In June 1976, some of the environmental librarians and information specialists from the Great Lakes region met in Chicago. Another group met again in November in Kalamazoo, Michigan and formed what they called: the INTER - PROFESSIONAL AD HOC GROUP FOR ENVIRONMENTAL INFORMATION SHARING (IPAHGEIS). The group sees itself as a loosely organized ad hoc group interested in promoting communication and sharing of environmental information on an interprofessional basis. The group's general goals are: A. To provide input and feedback on area environmental information projects; B. To act as a sounding board for proposed projects for resource sharing; C. To provide visibility for information resource sharing of environmental concerns; and D. To promote mechanisms for mutual assistance projects. IPAHGEIS just met again in Minneapolis. At that meeting we learned that the group is involved in two projects. The first is a serials holdings list available from the EPA Library System computer services. Libraries from the Great Lakes environmental collections have been invited to input their journal holdings to be included in the EPA Region V list.

The other project is a directory of area facilities. We are going to work very hard at making the directory as complete as possible. We will begin working on that this month with a preliminary listing out by the end of February.

In conclusion to this rather lengthy presentation, I would like to suggest that this symposium direct its efforts toward working with existing programs, services, and institutions. There is a plethora of information centers and sources in this area. If each of the information users in this audience would regularly use those resources in their areas, the libraries and information centers would be able to develop the kinds of services and information you need. You need to be persistent. If you do not find what you need ask for it. Try to anticipate the kinds of information you will need for a project so you can allow for ordering delays or interlibrary loans. If you don't make your needs known the existing organizations cannot provide the kinds of services that will fill that need.

I would like to end by paraphrasing the new president of the Special Libraries Association, Shirley Echelman's enaugural remarks at the SLA Conference last June. She said the work before us is: "the organization, management and dissemination of information -that most precious resource, upon which civilization depends for its historical perspective, its current decisions, and its future directions." I hope that I have helped disseminate some of that information today.

CHICAGO'S EXPERIENCE IN PREPARING AN ENVIRONMENTAL DIRECTORY

Carol Unzicker
University of Illinois

In order to introduce you to the rationale behind the compilation of the Environmental Information Directory, I would like to briefly describe the history of its formulation. In 1972 the City of Chicago prepared a lakefront plan that called for the coordination of public and private lakefront development and proposed the expansion of the City's present lakefront park system. Subsequent to the publication of the Plan, the City contracted with a team of experts to prepare a lakefront research agenda; a listing of the research needed to implement the program proposed in the Lakefront Plan. In order to allocate the City's resources in conducting the defined research program, it was necessary to determine where there were inadequacies in the knowledge base already available. Thus, the concept of the information directory evolved.

As a start we utilized eight computerized literature searching services to try to extract the kinds of information that we would like to have on the southern basin of Lake Michigan. The geographic specificity of this interest area presented some problems because many of the titles, although using Lake Michigan as a reference, would cover Green Bay or some other area outside our geographic scope of interest.

Because our time and our resources were limited, we utilized a priority system in compiling the directory. You will see this system described in the Directory's introduction. Our Priority 1 area extended from Waukegan down to approximately the Illinois-Indiana state line. Our Priority 2 area extended northward to Milwaukee, across to approximately the middle of Lake Michigan, and then to the Lake's southern extremity. Priority 3 was essentially the eastern shore of Lake Michigan.

This is the basic format that we used in profiling or abstracting the information that we came across. The profile form is rather extensive. It provides a lot more information than an abstract would. Probably the most valuable thing it provides is the latitude and longitude of collection points. This geographically pinpoints where the data was collected. This was why ENDEX was one of the most computerized reference services, because it had a geographical index - down to about 8 digits of latitude and longitude. Each profile sheet identifies the principal investigator as well as a contact point within the issuing agency.

A lot of times the authors had moved and were no longer affiliated with the issuing agency. The period of collection is another descriptive parameter. (One of our priorities was long term studies; not that short term studies are not valuable, but we emphasized those studies of more than one season in duration.) Frequency of observation was another valuable description. We found that the collections which were made once or twice would be of limited value for our purposes, and we tried to get a broader coverage.

The parameters identified also proved to be valuable descriptors. Sometimes the titles are very esoteric and it was difficult to tell exactly what the study covered. So we included a parameter listing which identified exactly what was measured in the study.

Collection methods are also important descriptors. It was helpful to people who are very specialized in their area, and know which collection methods are better than others, to help them qualify the study. Many times the principal investigator was also the data analyst, however, in some cases the principal investigator would acknowledge lab technicians and people who helped analyze the data. The parameters used in analyzing the data were sometimes different than those identified during collection. We tried to differentiate between the two; however, sometimes that was very difficult. In assigning a title to the studies we tried to give them as broad a descriptive title as possible. We didn't change any titles, but there were often several publications from one study.

In the data presentation section we tried to let people know exactly how the data was stored if such information was available. In what way is it presented-how could people access the information (which is one of the problems we had)?

Information about why the data was collected and how it was used was also deemed important, as well as possible additional applications. We tried to take this directly from the publications so that we would not color the information one way or the other.

The back side of the profile sheet was to accommodate additional information.

Once the sheet was completed it was sent back to the authors, who verified it and it then became a page in the directory.

Now I'd like to go through the process we used in preparing the Directory. First several literature searches were done and we went through directories looking for information that had not been published yet. That was a very difficult thing to access. We identified the studies and the authors; identified a contact person within the issuing agency, which was sometimes difficult; and the agency location. We proceeded to contact the pertinent issuing agencies and set up a visitation schedule based on a travel strategy.

We didn't make it to some parts of states and that is not because the agencies weren't important. It was generally because there was one agency in that area; and priorities, resources and travel distances being what they were, we were unable to schedule them. Many times we sent the profile forms to the authors or the agencies and asked them to please complete the profiles and return them to us.

Many agencies were very helpful in this regard. Once these profiles were returned they were examined as to their pertinence to our need. In some cases we did not include some of the profiles completed by others since they were beyond the scope of the Directory. The acceptable forms were typed up and verified.

There were two types of studies that we were dealing with. First were those that had been published already and were accessible through the information services that we utilized. There were also incomplete studies that were very valuable, but there were only a couple of directories that dealt with this kind of information. For the incomplete studies we had to search out and deal directly with the authors. When the author was available we had an interview and many times identified more authors and more material in this way; therefore, starting the whole process again. We found the authors to be very helpful in completing the forms.

When the author was unavailable it was difficult to proceed. Either we had to do the profile from the information that was compiled from other sources, or we couldn't get any information with which to profile the studies. For completed studies we had basically two sources; library collections and the issuing agencies. The library and reference center personnel were very helpful - they provided space to work and were helpful in identifying differences between their cataloging technique.

One recurring frustration was to locate a title that sounded promising, but once accessed would prove to be unrelated to our needs; either because it was outside our geographic interest or because the title was a misnomer of the content. This was another dead end. We identified many more potential references going through the catalogs by picking the subject areas and looking at every title. Although this may seem a little redundant, since literature searches were done, it proved not to be the case. Many pertinent items were located that weren't in the key words that were used in our literature searches. I don't know why they didn't show up but they weren't there.

The Agency heads were very helpful in providing access to agency publications. The research scientists and the information people again were donating copies of publications to our collection. These publications were often very valuable and reprints were at a premium. Once we complete a review of these publications, we will return those items that prove to be of limited value to our needs.

Many of the comments people made during our compilation were very helpful. I had a lot of very encouraging comments from people who were very excited about the Directory. They said "Hey, do you have anything on this? I'm doing something on this, do you have some citations?" Many times I did and this made me feel that the directory was really going to be used. Here were people saying, I need your information!" These kinds of comments were proof to me that this kind of resource is valuable and is needed. Although we had a very specific focus, I think there is a need for narrowing the information and increasing the accessibility of it.

Q. How many different places did you visit?

A. We ended up with approximately 210 to 215 profile forms in our directory. We view the directory as an ongoing process - that's the way it was set up. During the period of May to September close to one hundred agencies were contacted. I tried to go to locations where there were at least 5 or 6 agencies in that area and sometimes I could hit an agency on the way to another location and I tried to schedule my travel that way. Once our approach was standardized we were able to complete approximately three profiles per day on an average. This would include several false starts in terms of reviewing documents that proved to be unrelated to our needs.

Q. Just what type of information were you after and how much did it cost?

A. The type of information we were after - let me read you the Table of Contents - Earth Characteristics, Coastal Processes, Hydrology, Water Quality, Meteorology, Air Quality, Biology of Plants, Biology of Animals and Environmental Health, were the areas that we were trying to find sources.

In terms of the cost of the exercise, I would say it cost in the vicinity of \$7,500.00. Part of that funding was from other sources and part from the City of Chicago.

- Q. How did you deal with articles about remote sensing in your directory?
- A. It depends what the article was and what it dealt with. In some cases aerial photography was used for water quality or vegetation identification, coastal processes, currents, etc. Basically we were after information that would help us judge whether or not a given data collection would be useful to us for our purposes. That's why we put the profile sheets together.
- Q. Do you have a dollar cost if you wanted to distribute this as part of an access project? Does the City of Chicago have the budgetary capabilities of even attempting to distribute this?
- A. On a limited basis we are going to be printing up approximately 250 copies. A number of those copies are for contractual obligations with the Division of Water Resources and both the Illinois and Federal Coastal Zone Programs. As long as we have them we will give them out to people who are interested. Also, they will be available in NTIS. Since it is a government sponsored research study that was done the National Technical Information Service will offer them for sale.

APPLICATIONS OF INFORMATION SERVICES IN THE BUREAUCRACY

George Benda
Illinois Institute for Environmental Quality

During the past two years I worked on developing a very small scale information service for environmental programs in Illinois. Though the program was small—too small for computerization—I became attuned to the difficulties of supplying information to an unwilling bureaucracy. First, I ran into difficulties in collecting information; even the simplest methods of collection were resisted in most instances. Second, I ran into the apathy of potential users; even the most convenient forms of information dissemination were ignored. In talking with some friends in the information services field I discovered that these are common frustrations. Information services seem to be significantly under-used—at least in the eyes of information scientists.

The only justification for sophisticated information systems is extensive use. Computerized information services are expensive—very expensive. The investment is truly worthwhile only if the use of these services brings commensurate benefit to those who pay for them. Most—if not all—of us here today are government employees; we are paid by the tax paying citizens. If we leave aside the can of worms we find when we look at tax payer benefits from information systems; we can look at those who more immediately pay for these services—the bureaucrats. We then may ask:

- . Are information services used to the benefit of policy makers, program managers, and research coordinators?
- . Are there better and worse mechanisms for using information systems in the bureaucracy?

In order to answer these questions, I recently conducted a brief telephone survey of a number of local, state, regional, and federal resource managers who have an interest in both Lake Michigan and information services. We discussed, in some detail, their experiences with computerized information retrieval services. The survey sample broke readily into three categories, irrespective of affiliation:

- . In the first category are those individuals who have had experience with information services, but have abandoned them. Abandonment of the services by this as the result of a feeling of futility in using the computerized service.
- . In the second category are those individuals who have had experience with information services and find them useful. In general, this group wants to expand their use of computerized information retrieval services.
- . In the third category are those individuals who have not had extensive experience with information services. In general, this group sees some potential for applications of computerized information retrieval services in their work.

In working through the questions set out above, we should work from the criticisms leveled at computerized information services by those who've abandoned them to those who've seen the utility and finally those who want to learn about them to see the best applications of computerized information services in the bureaucracy.

The harshest critics of computerized information retrieval services are found among policy and planning level bureaucrats. This group, composed of those who have used information services in the past but have abandoned them, has a fairly consistent set of criticisms for information scientists:

- . First, computerized services require too much expertise to access and then to receive a useful output. In general, the output policy-planners received included too much information which was too superficial to be useful.
- . Second, the information currently available through computerized information retrieval systems is by and large not the kind of material needed for decision-making. Often, the services provide materials which are too technical for the policy-planner—a "generalist." Also, in the eyes of the policy planner, information is developed subsequent to a policy decision; hence information services is tied up in yesterday while the policy planner is looking to tomorrow.
- . Third, access to and output from computerized information services are too formal. Policy planners prefer to rely on the personal knowledge provided by technical personnel.

It is extremely important to note that cost is not a significant factor in the abandonment of computerized information retrieval systems, according to this brief survey.

Surprisingly, the criticisms leveled against information services by those who have abandoned them showed up frequently in the comments of those who are sold on them. To be sure, the information service users are a different group—in this survey at least. The users are by and large research coordinators. The information service users see it this way:

- . First, the user must become accustomed to the use of computerized information retrieval systems—half the battle is won once you are used to the system. But even those users accustomed to the systems pointed out that their main problem is knowing what is available, how to access it, and what to expect from different services.
- . Second, though the information currently available through computerized information retrieval services is of the kind that is useful for research from managers. There is a felt need for some user control over data bases in order to keep them relevant to the users' needs.
- . Third, user expectations must be aligned with actual system outputs. Information is good as a pre-planning tool, but it should not be looked upon as definitive. Also, users should not expect information services to provide all or even a significant proportion of the information necessary for policy

making. However, the information which can be retrieved through the computer is extremely useful for retrospective policy evaluation.

- . Fourth, the user must recognize the need for personal contact in addition to computerized information retrieval services. Computerized services are meant to supplement and enhance personal knowledge and contacts, not to replace them.
- . Fifth, cost is a limiting factor for some users who would like to expand their information services.

The difference between the continuing user and the user who abandons these services seems, at first, to be one of character or psychology. The user seems simply to adapt to the new technology better than those who abandon the service. However, as mentioned earlier, the users are for the most part research coordinators; the prior users are, by and large, policy planners. Considering this factor, it looks more like the user simply has more to gain from the use of information services. The crucial complaints of the policy planner who abandoned computerized information services are excessively technical nature of the information available and its inapplicability to policy making. That is precisely the point at which the research coordinator differs from the policy planners: he needs precisely that technical information to evaluate the technical aspects of the policy decisions given to him. Abandonment versus continuation of computerized information retrieval services rests on the disutility of the information itself. Information scientists must know their market.

But what of the untapped market, those who don't have extensive experience with computerized information retrieval services, but are interested? Who are they and what are their expectations? It is interesting that they, too, fell into an occupational category: they are mostly program managers. It is also curious that, like the information systems. This market might be tapped if we pay attention to their expectations and desires:

- . First, good libraries and manual data storage systems are adequate for the potential users current tasks. Most view computerization a possibility as their data storage needs increase. Potential users will use computerized services only if they make information more accessible. Input of new data by researchers is deemed essential and needs to be encouraged. Potential users also see a need for user control over input to insure the quality of the output.
- . Second, technical applications in specific areas of interest are the first use of computerized information services that come to mind for the potential user. Potential users usually think in terms of numerical data storage and retrieval; literature and current research data bases are not foremost in their minds. Broader potential applications of literature bases are not seen. Generally, the potential user sees some application of computerized services for program management, but that concept usually remains void of content.
- . Third, there is a need for education of potential users to the possibilities for application of computerized information retrieval systems. But there is an equal need for education about access methods. To this end, there was

significant call voiced for a directory or catalog of computerized information services. The desired catalog ought to describe the content of the information available, access methods, program capacities, search capacities, and possible uses of the information.

Computerized information retrieval systems are used by research coordinators. However, they are not used by policy planners and program managers. Use and disuse of computerized information services depends upon the benefits—in the terms of budgetary savings, time savings, institutional advantages, or personal prestige—perceived by the user or potential user. Research coordinators perceive advantages in time savings and institutional evaluation. They are aware of the monetary cost of the services to a greater extent than any other group. But for this group, the benefits, actual and perceived, outweigh the costs. Research coordinators want to expand their applications of these services. The limiting factor here is availability of information about systems and access.

Program managers generally perceive a potential benefit from the application of these services. The factor which limits the expansion of this potential is knowledge, knowledge of what is available, how to access it, and how to use the output. There remains, however, the group of policy planners. For this group, there are no perceived benefits to outweigh any cost. Computerized information services, as they exist now, do not fill any needs of policy planners. The capacities of the services themselves are the limiting factor for application of computerized information services in the policy levels of the bureaucracy.

The patterns of use and disuse which emerge from my brief survey lead me to make suggestions about needs which, if fulfilled, would increase potential applications of computerized information systems in the bureaucracy.

- . First, and most simple of the three, there is a need to develop comprehensive catalogs or directories of computerized information services, describing the content of various services, modes of access, and potential uses. This would benefit users, potential users, and past users alike.
- . Second, there is a need to educate users so that they become accustomed to the uses of computerized information retrieval services. This education must align potential users' expectations with the realities of the output capacities of the services. Disillusionment remains as a significant factor in the abandonment of the services.
- . Third, and most difficult there is a need to align the capacities of computerized information retrieval systems to the needs of the bureaucracy.

It is on this final need that I have focused during my past two years work. The integration of information services into policy planning presents political, budgetary, and psychological problems that appear almost insurmountable. Let me sketch, as a conclusion to my talk, some considerations in aligning information services to bureaucratic needs:

- . First, policy level bureaucrats need less technical information than do research coordinators. What is called for is something like the equivalent of

Illinois; legislative reference program for the executive branch. This might list, for example,

- any explicit overall policies stated by the executive;
 - legislative mandates to the bureaucracy;
 - agency's programatic budgets (possible if Zero-based budgeting, planned program budgeting, or management by objective programs are used);
 - active agency programs, with descriptions of ongoing work, contractual and in house.
- . Second, information must be systematically collected. This requires political impetus—the support of the executive. It is feasible to collect high quality information in Illinois through the budget and accounting systems. The budget functions appears to have great potential in this direction.
- . Third, information must be available in such a way as to make it as easy or easier to use than personal contact. This will require simplified access systems and a sound educative service. In addition, even if information at least initially, to make it plain to policy level bureaucrats that there are real benefits to using the services.

I conclude with a word of advice learned through hard experience: for information services to reach their full potential applications in the bureaucracy, information scientists will have to get their hands dirty; success will depend upon the ability of information scientists to obtain political support for their projects. Without retrieval service will have, at best, a limited application.

SESSION

II

NEEDS OF RESOURCE
MANAGERS & DEVELOPERS

INTRODUCTION

Leonard Crook
Great Lakes Basin Commission

I am going to start this session with a few comments of my own and then pose some questions for the speakers to respond to in their presentations. Although I don't want to interfere with their presentations, I want to encourage them to focus their discussions on what we are trying to accomplish here.

One of the things we need to get straight is whether we're talking about data or information and to whom we're addressing our services. Whether we're addressing them to the decision maker, the project manager, the research man, the research coordinator, or the person who is trying to get a specific detailed job done.

A great deal of soul-searching is necessary before searching for information itself. One temptation in making a search is to collect everything there is on the subject you're talking about. However, you should scan that information, you have to screen it, but then you have to start discarding it early in the process.

In order to get down to the essential information it is necessary to dispose of that which is peripheral to your need, that which is of questionable quality, and that which turns out to be useless.

This is particularly true of planners who are looking at a lot of different types of issues.

I want the speakers to address themselves to a series of questions. What types of information are your organization's programs going to need? Where are these needs presently acute? What information services and systems have you found useful? What problems have you incurred in using them, either in terms of the information provided or in terms of system adaptation?

I question the practicality of any "comprehensive" information system; and even more so the practicality of one organization having a series of systems. This will depend on the organization's approach to "sharpening up " its information needs. The approach taken and the level of expertise involved in the screening process are both extremely important. Too often the task of screening information is given to a junior staff member.

There is a great deal to be learned by that screening process. The project manager ought to be directly involved in it; or at a minimum a good portion of the results ought to pass through him so that he has a feel for what is available, who has it, and how to use it.

Before most people can use an information system, they need to know how the data can be accessed does the system actually have the information that it claims to have in whatever form it's referred to. What form is in that data? What standards were used in its acquisition? What tests were used in its screening or analysis? How accurate is it? Is it raw processed data? How is it geographically referenced?

Is the use of that data restricted in any way? Can you run a test for a particular known situation to see whether the system works? The proof of usability is in making sure he can get out of a certain system if he'll just do this and it will only cost him so much. Then let him try it and find out that it doesn't work that way.

We've got a lot of good people and I shouldn't be talking - I should be getting them to talk to you. These people have been chosen at different levels of federal, state, etc. as their program indicates and you have their names and their affiliations there.

Edward Hanses who is our first speaker from the U.S. Corp. of engineers has been working in the E.I.S. Section. All of you are familiar with E.I.S.'s or whatever and I'll let him talk to you now the on "the Needs that the Federal Agencies Have in the Information Systems."

INFORMATION PROBLEMS AND USER NEEDS - ONE FEDERAL PERSPECTIVE

Edward Hanses
U.S. Army Corps of Engineers

My talk today will focus on an overview of the problems confronted by the Chicago District of the U.S. Army Corps of Engineers in locating and utilizing environmental information in Environmental Impact Statements. My position with the District is Chief of the Environmental Resources Branch within the Planning Division. It is the Branch's responsibility to prepare EIS's for Corps projects.

We operate on the philosophy that a team of experts is required to prepare proper statements. People with expertise in biology, sociology, archaeology, aquatic ecology, and landscape architecture are among the several disciplines required. This results in a holistic approach to analysis; and in the case of Lake Michigan its function is to analyze an aquatic ecosystem.

We address ourselves to three questions in preparing environmental statements; what, why, and how. In order to answer these questions, however, we must develop a data base. Where do we get this data base? We get as much as possible from the sources that have already been mentioned; from previous research studies, from aerial photographs, from technical reports, and from many other sources.

One problem in utilizing information from these existing sources, however, is that we often suffer from information overloading. It is often necessary to wade through several volumes to obtain one or two useful pieces of information. This problem becomes even greater when looking for site-specific information -about Green Bay for example. Even after contacting every source we possible can, we still often have far more holes than we have information to fill them.

In some cases it might be possible to use information describing a nearby site for your own purposes. In most cases through this is unacceptable to those who must approve the statements.

What constitutes adequate information? In many cases the most up-to-date information we are able to locate is three or four years old. In many cases it takes a number of years to go through the steps of obtaining authorization for a specific project. The physical environment is constantly changing during that period. Information you obtain about hydrologic and ecologic phenomena at the inception of the project are out of date by the time the EIS is prepared.

Even after the project has been completed and is operational, how accurate was the assessment of impacts? Monitoring information is extremely valuable in this regard.

Different types of information are needed at different phases of the project. First of all we need a data base that will allow us to describe the environmental setting within the area of concern. Then we will need data to help in the preparation of impact analyses to determine what's going to happen if the project is constructed. The concerns that must be addressed are not limited just to the physical environment, but sciological and cultural factors are important as well.

One example of the complexities of the problems we must address might be helpful. One project that comes to mind is the increased diversion of water from Lake Michigan for water supply and pollution control purposes in the northeastern Illinois region. Although this sounds like a simple project, there are numerous potential impacts which could be felt from the Mississippi River to the Saint Lawrence Seaway in New York. There are regional, statewide, national, and even international implications associated with this project. Increased flooding in the Mississippi River, decreased hydropower for the Canadians and the New Yorkers are among the many potential concerns. Another host of problems, and a group little discussed at this symposium, involves the people; what they want, what their fears and concerns are, and how such a project might affect them.

Where do we find the answers to these questions and concerns? Many of the answers to the questions about the physical environment can be found with few problems. However, the answers to the questions with socioeconomic implications are much more difficult to locate.

These are some of the problems we are confronted with at the Chicago District and we are very interested in finding ways to solve them. We are especially interested in getting tools that better serve our purpose.

INFORMATION PROBLEMS AND USER NEEDS-A STATE COASTAL ZONE PERSPECTIVE

The Great Lakes Basin Commission
Jerry Kotas

My talk today will touch on the general information needs of the Coastal Zone Management Programs, some of the problems that have been encountered by the state programs, and some recommendations including a proposal for a Great Lakes Information and Referral Center which was made by the state coastal zone programs.

The eight Great Lakes are developing Coastal Zone Management Programs pursuant to the Coastal Zone Management Act. of 1972. There are two basic phases to Coastal Zone Management - program development which is Section 305 of the Act and program implementation which is Section 306. There are four states in the Great Lakes region that anticipate moving into program implementation within the coming year.

Those states are Minnesota, Wisconsin, Illinois and Michigan three of which abut the southern basin of Lake Michigan.

For those not familiar with Coastal Zone Management, it is a program wherein states formulate comprehensive shoreline management programs following federally established criteria. The states are charged to develop and articulate policies for the management of the coastal resources. They draw together the existing state programs and policies and articulate clearer policies when necessary. Because of that reason the program managers and most of the state coastal zone staff are generalists by nature of their jobs. The coastal zone staffs are not generally oriented toward primary research. Their role is to coordinate and, integrate; often serving as a catalyst to get research going.

The type and scope of environmental information needed by the program often depends upon what state agency is assigned as the lead agency for Coastal Zone Management. For instance, if a State Planning Office is the lead agency, which is the case in Wisconsin, there may be different orientation to the perceived needs for environmental information than if a state agency has regulatory responsibilities also (the Department of Transportation for example).

In preparing this presentation I talked with several of the program managers to elicit their perspectives on these problems. The Coastal Zone Programs in the Great Lakes region continue to rely on informal mechanisms for information exchange. Personal contacts are relied upon to get information to a great extent - they rely on the technical experts in the appropriate agencies to be knowledgeable about available environmental information and data. This can be stated in terms of a strategy which is to make those with a responsibility for collecting and disseminating environmental information and data more responsive and less duplicative in their efforts. Also, there appears to be an intuitive evaluation or filtering mechanism associated with the use of personal contacts that is not there in the output from some of the computer systems.

Institutional information is also needed for the development of these management programs for the coastal areas. The greatest source of this information is through personal contacts with other states and with the Federal Office of Coastal Zone Management. In this region, as is true in most others, the information needs are often identified for the state by local units of government; in this case the City of Chicago.

Access to physical and biological information seems to have fewer problems associated with it than with other types. Some of the reasons for this are that there are fewer individuals involved in this area of research than in some other areas; therefore, maybe there are fewer documents.

The biggest problem area in terms of information and data appears to be water quality. This probably won't be news to many of you, but many entities at several levels of government collecting and utilizing water quality data. The fact is that there is no consistent reporting of the data and information: No standard formats are being utilized or standard parameters being cataloged. Much of the data or information is not being reported to any computerized system, and in fact, some are not being published in any form. This data is very important in the decision making process; for the setting of standards and the operation of beaches. For example, the park districts use them, the water filtration plants with their concerns as the amount of chlorine to add in purifying the water, and the health department's concerns, as to environmental health are among many entities using the data. There is generally a great need for coordination of water quality data; for gathering of the data and reporting at the various levels of government. This is an area where State Coastal Zone Programs can provide some assistance by working with pertinent units of government to work toward a consistent series of parameters and a more regular reporting of these data especially to the appropriate information systems.

In addition, the research communities must be aware of information systems. This was pointed out several times earlier. How best to utilize the systems? Where to access the systems? How to improve the systems to meet the changing needs of these different communities. Systems must be made more useful to the policy makers - at all levels of government.

One idea to help encourage the utilization of the information systems would be to require federally funded environmental research efforts to provide descriptions of their research and to report the results to the appropriate information systems. I understand that the Smithsonian Science Information Exchange and NTIS have gathered some of this information but apparently this needs expansion. There needs to be an emphasis on computer information systems wherever appropriate. That is something that could be considered for federally funded projects and for others.

In terms of future information needs, the State Coastal Zone Management Programs and several other water resource entities in the Great Lakes Region have recommended within the past year that there be a center established in the Great Lakes region to assist in the referral of water resources information and data. The Coastal Zone Programs have recognized the need for a regional focal point or centralized contact to assist both the information gatherers and users in keeping aware of water resources information and data.

The State Coastal Zone Management Program, because of the perceived regional needs, have recommended that the proposed Great Lakes Information and Referral Center be more broad in scope than just coastal information. These recommendations respond to the increasing demand for and focus on the limited water and related land resources in the Great Lakes region. Responding to the expressed needs and requests, the Great Lakes Basin Commission and the Great Lakes Sea Grant Programs have decided to work together in the establishment of the Center.

Because of these recent developments, I'd like to take just a few moments to describe to you some of the major elements of this proposed Center. The staff of the Michigan Sea Grant Program, which in these dealings has been representing the Great Lakes Sea Grant Network, has been working closely with the staff of the Great Lakes Basin Commission on the institutional and technical arrangements for the center. The anticipated Information Center will be established in early '78 as part of the national network of coastal information centers. It is anticipated that nine such regional centers will be established across the country and the Great Lakes Center would be one of those. Following considerable discussion of approaches to implementing such a center in this region, our cooperative effort was pursued between the Great Lakes Basin Commission, and the Great Lakes Sea Grant Programs. This will allow a linkage of the governmental entities, the considerable information resources and expertise of the Sea Grant Universities (including the advisory service network) and the extension services in the land grant colleges. The proposed center will be housed in Ann Arbor at the Basin Commission.

The goal of the Great Lakes Water Resources Information referral Center will be to increase and facilitate exchange of water resources information and data about the Great Lakes Region. The objectives and work products suggested by the coastal zone management programs for the center respond to many of the recommendations and suggestions made by the first panel today. The objectives of the proposed center are to formally establish a water resources information and referral center in the Great Lakes region with maximum regional support. It will build upon existing capabilities, utilize existing systems and avoid duplication wherever possible. The proposed center will not attempt to archive data but will attempt to increase awareness about existing information systems and will promote increased utilization of these systems. To give you a better idea of what is intended for the first year effort let me just briefly describe the services and products that were suggested by the states. It is anticipated that the Center will provide a number of services and products during its first year of operation. The first of these is a water resources information referral service. The center would keep a current survey of information sources throughout the region (including governmental agencies, U.S. and Canadian, Universities, other researchers, and libraries, among many), with an emphasis on how to access information from these sources. The center would keep current information on existing information retrieval systems and how to access and utilize such systems.

One anticipated product from the Center would be a pamphlet describing existing computerized information and retrieval systems available in the Great Lakes Region. There are several existing systems in the region which are not presently

being utilized to their fullest potential. The Information in the pamphlet would include a description of the systems, the information they contain, how to use the systems and where in the region potential users could access these systems. In addition, efforts would be made to coordinate the existing systems and to refine them as necessary to make them most useful to user groups and other information sources in the region.

A third anticipated product would be a Great Lakes Water Resources Expertise File and the center would be the contact point to locate resources in the region, or elsewhere, doing water resources related work in specific subject areas.

There are several expertise files already available in the region including the Directory of Great Lakes Research Activities, published by the Research Advisory Board of the IJC; the Directory of Environmental Scientists, published by the Institute of Ecology for the U.S. Army Corp. of Engineers; the Great Lakes Directory of Universities Research Institutes, Libraries, and Agencies Concerned with Water and Land Resources in the Great Lakes Basin, published by the Great Lakes Commission; and others. So rather than create an additional file, the center would inventory and coordinate existing files and actively promote continual updating of the files, to make user communities more aware of them.

LAKE MICHIGAN AND 208

Gary D. Harmon
Northeastern Illinois Planning Commission

The Northeastern Illinois Planning Commission (NIPC) has been designated to perform area wide water quality planning in accordance with Section 208 of PL 92-500 — the "Federal Water Pollution Control Act Amendments of 1972". The objective of the program is the development of a plan to improve and enhance water quality in Cook, DuPage, Kane, Lake, McHenry and Will Counties, Illinois. The project began in mid 1975 and will be completed in May, 1978.

The planning area encompasses approximately 3700 square miles and includes both intra-state and inter-state water bodies. Principle interstate water bodies are: the Fox, Des Plaines, Little Calumet, and Kankakee Rivers, and Lake Michigan.

Because of time and budget constraints, technical planning was abbreviated in many areas. It was not possible, for example, to conduct a fullscale research program sophisticated enough to adequately account for all the complexities of pollution of Lake Michigan. With the knowledge that water quality problems in the Lake are being addressed by a variety of other agencies, the Commission efforts were limited in scope. Our principle effort has been the sampling and analysis of water flowing into the Lake via streams and ravines. Five in-stream sampling stations were selected on Lake Michigan tributaries and two (2) ravine sampling stations were selected as a part of our land-use runoff program. Intensive sampling and analysis for up to 19 constituents during 1976-1977 has produced useful data.

The importance of Lake Michigan cannot be overemphasized. Water supply, recreation, navigation, aesthetics and mineral resources are key elements that can be obtained from the Lake for the benefit of all.

Therefore, because of the Lake's importance and the need to address it in our 208 project, even with our constraints, we decided to prepare a staff paper which would highlight the water quality activities of other organizations as they relate to the Lake. This paper would supplement our limited technical program.

The NIPC staff paper was intended to provide an overview of water quality conditions and trends based upon historical, recent and on-going studies within the Illinois portion of Lake Michigan (which represents only 7% of the Lake's surface area). Approximately 0.5% of the Lake Michigan drainage area is within Illinois.

The information which formed the basis for this paper guided the Commission regarding the relative emphasis that Lake Michigan was to receive in the 208 planning program. Thus, this paper can be viewed as the rationale for the Lake Michigan portion of the 208 planning program.

Based upon all information reviewed, this paper reaches the conclusion that, from the perspective of Northeastern Illinois, the water quality problems of Lake Michigan are relatively less critical than those of the regions inland waterways.

A number of problems were encountered during the preparation of the staff paper. We were interested not only in water quality monitoring programs but also in benthic and fish monitoring programs, at Federal, State, regional, county, local and private levels. Information gathering was required at each of these levels since, to our knowledge, there was no central repository for such information.

Much time was therefore expended in the preparation and mailing of a general type questionnaire to selected organizations. We were trying to answer the questions of who? (Agency), What? (type program) Where? (location), when? (frequency), How? (methods) and why? (reason for program). We were of course interested in the opinions or interpretation of various organizations, based on their monitoring program, of the water quality trends in the Lake. Some of the problems we encountered included:

1. Who is conducting monitoring programs on Lake Michigan and what are the details of the program.
2. Inability to access reports that were underway.
3. Accessibility of accurate data or information within a reasonable period of time.
4. Need to separate continuous or intensive monitoring programs from very intermittent or one-time only data.
5. Looking at data or information generated at the macro or whole Lake level, and trying to utilize it at the micro level or in Illinois portion of the Lake.
6. Need for at least an annual interpretation update of all data not only at the whole Lake (macro) level, but also at the micro level. We also need to continue to distinguish between in-shore and open water data.
7. During any 208 continuing planning process, we would face these and other problems should a more detailed study be proposed.

Responses to the questionnaire used in developing our staff paper revealed a variety of local water quality monitoring programs already operating in Illinois waters. Information from these sources needs to be compiled for comparison and analysis so it can provide the basis for more detailed evaluations of local water quality trends.

Also, the data generated as a result of our 208 program needs to be compiled in a central location so that the data and sampling details are available to others.

A coordinated sampling program together with a data and informational storage and retrieval system for Lake Michigan appears necessary at State & Federal level. Such a program will provide adequate data for identifying problems and sources of wastes and for monitoring the effectiveness of pollution control programs. Results should provide valuable information on water quality trends pertinent to northeastern Illinois.

The coordination efforts that would be necessary to meet this objective might also seek to develop greater uniformity in sampling and analytical procedures among various agencies. Ultimately, each water quality surveillance program might be linked to a comprehensive system for the collection, storage, and retrieval of all information generated by public and private agencies operating on the Illinois portion of the Lake.

In addition, I would suggest closer communications among the staffs of the various organizations involved with Lake Michigan water quality. This symposium is a step in that direction.

INFORMATION PROBLEMS AND USER NEEDS: THE CHICAGO PERSPECTIVE

Russell Davenport
City of Chicago

In a previous session of this symposium you heard a presentation describing the Environmental Information Directory that was prepared for the City of Chicago with the help of the federal Office of Coastal Zone Management and the Illinois Division of Water Resources. To give you some background on why the Directory was prepared I would like to briefly describe Chicago's lakefront history.

The City of Chicago has been involved in lakefront expansion and development for a good many years. Well before the turn of the century the City initiated its first major landfill and this has proceeded to the point where most of the City's lakefront is filled land. Further to the point, twenty-seven of the City's thirty miles of frontage on Lake Michigan are now an integral part of a lakefront park system managed by the Chicago Park District.

During the late 1960's and early 1970's the lake levels rose substantially above its norm which resulted in major flooding and erosion problems. This set of problems in combination with a tradition of lakefront park development led to the development of the latest in a series of lakefront plans; the 1972 Lakefront Plan of Chicago. That plan focused on two important elements.

One fundamental concern was the type of development that was occurring along the lakefront. The public concern here led to the enactment of the Lake Michigan and Chicago Lakefront Protection Ordinance in the fall of 1972. This Ordinance provided a mechanism to regulate and coordinate development.

The second element of the Plan involved a major program of land extensions to expand the recreation opportunities available along the lakefront. The premise on which the proposal was based was the availability of fill from a variety of planned public works projects at little or no cost. The parklands created by the landfill would also serve as a buffer between the existing developments and Lake Michigan protecting them from erosion and flooding.

The 1972 Lakefront Plan of Chicago posed a number of questions that required answers before the City could proceed with any full-scale program of capital improvements. A research agenda was prepared which spelled out the various studies that would need to be accomplished. That document was the first attempt at identifying the information needs the City would have. With the areas of research thus defined the question then arose: Where could existing information in these subject areas be located? Thus evolved the idea of the Environmental Information Directory.

The steps that we took in preparing the Directory were spelled out in a previous discussion and does not need to be repeated here. Therefore, what I will do is to supplement that presentation with some comments and then attempt to respond to Leonard's questions posed at the outset of this session.

As a result of a preliminary search of available information we were able to locate the Environmental Data Exchange (ENDEX Program which is administered by the U.S. Environmental Data service. This program provided a computer print out that identified and described more than two hundred data collections that were of potential value to us. Although the information it provided was helpful, it did not fully satisfy our needs for two reasons. First, the descriptive information it provided was inadequate to use in evaluating the validity or usability of a given collection for our purposes. Second, it was intuitively obvious that the collections identified by ENDEX were only part of the total available.

As I said earlier the City of Chicago performed a preliminary analysis of its information needs and identified four types. These included generally descriptive information capable of being used for preplanning purposes, baseline data to be used in characterizing the environment, process-related information capable of being used in environmental assessments, and detailed site-specific information to use in formulating lakefront designs.

Three things became apparent in searching for existing information that would be useful to our purposes. First, information descriptive of socioeconomic environment in an urban area such as Chicago is more readily obtainable than information about physical environment. Second, it is impossible to categorize potential sources into one or more of the four hierarchical types identified previously without performing a detailed analysis of each collection. Third, it is difficult to evaluate the usability of any given collection using solely such systems as ENDEX or SSIE.

Our analysis of the situation led us to conclude that it would be desirable to institute a three step screening process to evaluate the various collections presently available. A positive decision at each step would be necessary to incorporate the collection in to the City's lakefront data/information base.

The initial screening step would cover a review of the geographical and topical scope of interest of the collection together with its accessibility. The third item was included in the screening process because even the most germane information is useless if it is inaccessible.

The second screening step would allow a reviewer to determine whether or not a detailed analysis of the collection is warranted. It would cover a review of the collection in terms of its size, period of collection, frequency of observation, and the purpose for which it was collected. This screening step would help filter out those collections which are out of date or of only limited potential value. It is also at this step in the screening process that a reviewer could determine whether a collection might be of value for preplanning purposes, but probably of limited value for other purposes.

The final screening step would allow a reviewer to determine whether or not the collection is suitable and/or desirable for use. It is at this point that it is necessary to determine the accuracy and reliability of the collection. Although this is a "tough nut to crack" some insight could be gained by evaluating the methods and techniques in collection and analysis. A "peer" reviewing this point might be helpful as well.

The final screening step should also focus on the economics involved if the collection is to be used. Is it worth the cost involved both in terms of the price tag on the collection itself and the cost of reformatting it so that it is usable for lakefront purposes. A given collection in its present form, for example, might be useful for describing the environment, but would have to be reformatted at a substantial cost to make it usable for assessment purposes.

In conclusion, it is important to realize that there are basically two types of information capabilities that we have been talking about. One involves a data or information archive that would serve much like a supermarket where it would be possible to pick items off the shelves on an as-needed basis. This would mean some type of "centralized warehouse" operation and I question the cost-effectiveness of this. Before such an operation is established it should be the focus of a detailed cost-effectiveness analysis.

It is a completely different story, however, when you talk about the second type of capability; a clearinghouse or referral capability. In cases such as those you are able to find out who has a given collection and what it will cost you and it's up to you to decide whether or not you want to make the effort to go get it. This type of capability could be established in a much more cost-effective manner.

SESSION

III

NEEDS OF
ENVIRONMENTAL RESEARCHERS

INTRODUCTION

Dr. Robert Ragotskie

University of Wisconsin

During previous sessions numerous questions were asked about information. How does one get the right information? How does one get it in forms that are useful?

I would like to raise a few points to lead off this session that I hope will stimulate some discussion. I hope they will stimulate you to ask some questions and perhaps say they are not problems at all, or else to address the problem and see if we can't make some small progress for their solution.

It occurs to me that the resource manager or the planner does not need and usually can't use research information in the form of research reports or scientific papers. The manager needs a mechanism for searching out the information, collecting and filtering it, and selecting the information which is valid. Then that information which is selected needs to be organized and packaged in a form that the manager can use.

For example, aerial photographs were mentioned before as a source of information. If a town or county doesn't have an aerial photograph expert, it doesn't do much good to provide them with an aerial photograph and say it's all there. How can the data be extracted from the photo and organized into a useful form. That's a tall order, but I think that's what's bothering many of you and I see it all the time.

I would submit that the Sea Grant Advisory Services Program addresses this problem. A lot of time is spent in organizing and packaging the information so that the resource manager gets what he wants, in the form he wants; whether it be a legislator or a person who sets environmental standards.

Another thing that occurs to me is that the manager-user often needs help in formulating his needs. He thinks he knows what he wants but perhaps he could benefit from discussing this with the person who has the information. In this way the user's needs are satisfied and he is not swamped with a bunch of data and information that really isn't going to help. Once he has formulated his needs then he can start asking questions of the information system or the expert. This is something that the science community and research community should do.

There are two other points of discussion I would like to raise and the first is the question of quality control. This is perhaps the one that bothers me the most. I think everyone agrees that bad data is worse than no data especially if you don't know it's bad. How can a resource manager know whether it's good or bad? I don't think he can. By the time he gets the data, it's so far removed from the source, he really has no way of knowing how good it is. So if he gets it he has to assume it's good or else he can't do anything. There are a number of things we're concerned here with. Is the data reliable - is it correct? Are they absolutely in error or are they simply obsolete? Is the data representative or non-representative? All these criteria have to be checked before you start using it. In my view this is the

greatest shortcoming of information retrieval systems. I'm not talking about bibliographical retrieval systems or references and paper searches. Those I think are extremely useful and once you get the paper you can decide yourself whether it's useful or not. But, data retrieval systems and data banks are really subject to a lot of hazzards in terms of quality control. Once data gets into an information data bank there's no way on earth to exert any quality control on that data. The only way to control quality is at the input end.

The last point is the question of cost. The cost of these systems is real. The user sometimes pays for the systems, sometimes the system is subsidized. These vary all across the map, but the cost is there somewhere. The taxpayer may pay for them in the case of subsidy.

It's not just the cost of the system. but there is a cost of the researcher as well. Someone has to supply the data to the system and that's usually not accounted for at all because that comes out of his hide or his budget.

It's awfully hard to assess the real cost of these data information systems. Are they cost effective? Are they producing information at a reasonable cost or is this an expensive way to go about it? I think it behooves all of us and especially people who use the information to ask the question: What is the most efficient and effective way to get the information? Are there better ways of getting information besides automated retrieval systems? Perhaps old fashioned ones, perhaps new ones. I submit these should be considered before you commit yourself to one or the other. I think other speakers will say don't commit yourself to any one. Use them all. That's nothing new but it bears repeating.

INFORMATION NEEDS FOR RESEARCHERS: ONE FEDERAL PERSPECTIVE

Clifford Risley
U.S. Environmental Protection Agency

I have been asked to talk about problems and needs for improved accessibility to information that results from research activities. In my capacity as Director of Research and Development (for Region V of the U.S. Environmental Protection Agency) I serve as a research coordinator and liaison. This involves reviewing proposals as to their responsiveness to regional needs and problems. It also means assisting the sixteen research laboratories within our agency to provide our office with the information it needs to function.

My comments today are from the perspective of "national needs" which occur at a "regional level". Although the topic at this symposium is the southern end of Lake Michigan, the concerns pertinent here are pertinent elsewhere as well. For example, even though the research laboratories are directed at national goals and needs, they are extrapolated and generalized from specific local problems. However, we are not here to talk about specific problems about the Lake, but to talk about the general problem of information; its accessibility and retrieval. In this regard I would like to share with you my experiences in giving advice to policy makers and to program managers.

In cases such as these, rather than going to an information system or computerized data bank I go directly to the researcher who spends all of his time dealing with that topic. Therefore, my major source of information, (as is the case for most program managers or policy-makers)) is a directory of who does what in research. Since the directory of who does what in EPA and in the state universities and our region is quite large, it becomes too much for a policy maker to have the names of all the research people at his fingertips. Therefore, he turns to a person like myself for assistance. It is my responsibility to try to know all the people in the research community, what they do, and what their areas of expertise are.

When policy makers are confronted with a problem and they need answers, within the hour sometimes, they turn to me. I have to draw upon my understanding of all the research reports and my contact with the research community. Collectively we try to come up with a quick answer to the problem. Unfortunately, these quick answers often provide the basis for a decision although I don't like to see a decision being made on this basis. What happens if we're out on a field trip and the answers aren't even there? However, quite often decisions are made without even the benefit of what advice we can give. Decisions have to be made - sometimes immediately.

Suppose we have hours or days to work on a problem - then the system gets much better because we are able to locate and utilize the expertise of the research laboratory and the research expert who spends full time in the area in which our problem occurs.

If we have more time to work on it, the researchers will dig in to their files for additional information and they will refer us to reports and publications that are readily available to us. They'll give us the benefit of their judgment on these things. We can go dig up the additional reports which we have available, put these in the hands of the program manager and the policy maker, highlighting the

conclusions that are reached or underscoring some of the bases for these conclusions. We try to be as helpful as possible in giving that decision maker what he needs to know.

When we have a longer response time, something like weeks, then we're in a good position to request technical assistance from the pertinent researchers or we may contact a panel of experts in whatever fields are involved. We can call them into our office and discuss the problem at some depth.

One of the dangers you get into when a policy maker asks for advice in a short period of time is the problem of communication. A decision maker who is in a hurry and who doesn't understand the topic at hand will have trouble asking appropriate questions. There is often interpretations of intent or need which may or may not be exactly what was desired. When I go to a researcher for assistance, the more information I am able to provide him with, the more assistance he will be able to provide me.

When we are able to discuss the problem in some detail then it is possible to provide as much information as the decision maker needs. However, when the available information is incomplete but you have a few weeks or months to answer the question, you have time then to outline the research needs - the things that need to be done. You may start a short term research program or the first phase of a longer term research program to really answer the questions that are raised. When you get into these longer time frames that's when the computer searchable bibliographies and other services are extremely helpful.

The Environmental Protection Agency performs another research function in the area of technology transfer. This program provides research information reduced to a colorful, concise form, and in a readable manner. We try to reduce the research results discussed in one or more documents into a capsule report which is anywhere from four to ten pages long. These capsulated reports spell out the nature of the programs, what the findings were, what technical advantages this system provides, and what the cost effectiveness of it is. This is presented in a manner which is easily understood by either the general public or a program manager.

The technology transfer program started out in the municipal water and waste water treatment fields; expanded into industrial problems, mostly water; and is just now beginning to consider air pollution problems.

After talking this morning about 208 Planning, I had to bring up this point. NIPC talked about 208 Planning. The planning programs now underway under the sponsorship of Section 208 of the Water Pollution Control Amendments provides a good example of extremes in terms of information. Earlier we heard about the problems of the Northeastern Illinois Planning Commission and the problems of selecting the information which is most appropriate to their needs. In other parts of the country there are river basins where there hasn't been research performed in years and the planners have no data to work with.

One problem that has been with environmental agencies and their predecessors for years is that when studies are funded, field research accomplished, and laboratory

analyses completed the results are often filed away. The findings were never published and often once they were filed were lost or never cataloged. Changes in staff, in priorities, and in study methods means that it is difficult, if not impossible, to verify the data files in case they are ever relocated.

No one agency is responsible for collections of data and I think this is one of the worst problems we have to face. There are too many data collections, and programs available. I would like to have that library listing that was given earlier, but at the same time it appalls me that we have so many computer services of information, so many computer collections. There are too many libraries with their own sets of information. Now if all of these libraries had all their own information, plus everybody elses information, that would be excellent. But, they don't.

Another point is that research reports are too voluminous, and too detailed for the average person to use. I receive all EPA research reports as soon as they are published. Four years ago that was great. I'd look through the reports and read at least the abstracts and the conclusions. Now they come across my desk so fast that I can't even do that. I now try to get someone on my staff to copy the abstracts and conclusions and pass them around to program managers so that they know what the latest research is.

We've tried all kinds of summary reports and news letters from laboratories. But, you can't even read all the newsletters that come by because there are so many. It's a real problem and far be it from me to decide whose news letter is best.

I want to give you a case in point as an example. The Reserve Mining Case started in 1965 with a federal study of mining discharges, so we've been involved with this thing for 12 years. The state had studied the problem maybe 10 years before that because of complaints from fishermen.

By 1970 the state had come up with water quality standards and criteria which they tried to impose upon Reserve Mining Co. and Reserve sued them saying that these standards were capricious.

The judge who tried that case in the state court was not technically trained and wouldn't rule on anything he didn't understand. So our expert scientists were called in to testify and many of our expert witnesses were testifying for the first time. So the judge wouldn't listen to the scientists but did fly out over the discharge area and saw the problems for himself. The discharge permit stated that material was to go into the water in a 9 square mile area. It's pretty obvious when you fly the area that this is being exceeded. The judge ruled on that because he could see it. He did not rule on the merits of the state-imposed standards and the case was overruled in the state supreme court because the original judge hadn't been qualified to hear it. The case was then transferred to the federal court.

By this time our Duluth laboratory was created and had become involved in the enforcement case. The scientists had learned something about the need for enforcement-type information. Even with only one discharge on the largest lake in the world, the pollution issue was fought and won. The case was fought on the basis of manganese which wasn't even considered a nutrient. The lab used suspended solids as a tracer for industrial pollution and they developed new methods including x-ray analysis for minerals.

One of the things the scientists learned was that they knew nothing about what is termed as "chain of evidence." They found out that if you go out and collect a water sample that you have to identify it and seal it and start a chain of evidence document. Each step taken in analyzing the sample has to be documented. Each time the sample changes hands it must be signed for and a "chain of custody" has to be established. This must continue until the case gets to court. All the defense or opposition has to do is demonstrate that somewhere along the line the chain of custody was broken and the court will throw out all the evidence.

Researchers aren't used to these sort of requirements, but they learned from this process. Is there any advantage to doing this on the part of the research laboratory? Well the scientists learned a lot of things as a result of this case. I got them involved in new research because they had to answer questions that arose in the enforcement case. But for every question they answered, they raised a dozen new questions.

Almost any study done by a university researcher would be inadmissible in court because there wasn't a "chain of custody" or a "chain of evidence". A biologist for example generally could establish and document the "chains" more easily than could a chemist.

In conclusion, information generated by research and development is too complex to be useful to the program manager or the decision maker unless it is done specifically along the lines such as suggested earlier. Information generated by research needs to be translated into a more digestible form for the busy administrator and for regulatory people organizing information into a form suitable for publication in scientific journals is completely useless from the perspective of a regulatory program.

Organizing information so that it will be useful to a regulatory program, or to a lawyer in a regulatory office so he can present it to a judge is a greater challenge than writing a technical publication. You've got to be able to reduce the publication down to a useful form, but still retaining its credibility so that it can't be misused,

One last point is that decisions are made and actions are taken every day by regulatory agencies at national, state and local levels. These decisions are being made by officials who are using information available to them on only a limited basis. Why is this the case? I think we have heard at least one hundred answers to that today.

SEA GRANT AND LAKE MICHIGAN

Robert Ragotskie

University of Wisconsin

I was asked to say just a bit about the Sea Grant Program. Many of you know what Sea Grant is, but maybe some of you are confused about it or would like to know a little more.

The Sea Grant Program is a university research program which was established ten years ago. Its main goal is to identify, develop, and promote the wise use of marine and Great Lakes resources. It's a very wide ranging program that has caused a lot of difficulty, but it has also provided an immense opportunity.

The program has dealt with a variety of resource issues including fish, minerals, water quality (as it bears on other resources), and other coastal resources.

The program includes just about all academic fields — the natural sciences, economics, law, the social sciences, and engineering. It actually includes humanities and the arts, although this hasn't been developed too well yet. The program operates in three realms; research, education, and advisory services. Perhaps you're all familiar with the first two. Research involves the discovery and generation of new information, the organization of this information, its interpretation and recording. Education involves the transmission of new and old information and the safeguarding of existing information. However, in our view it is the advisory services that makes the whole thing work. That is the function which says the information, whether it be from recently generated research or from the archives of the university library, needs to be transmitted to the user. There's an awful lot behind that word "transmit." It isn't enough to simply turn it out and hand it to the user. It means interpreting the information, organizing it, formatting it, packaging it and getting it to the users in any way we can. This may be by publication, by workshops, by electronic media. It might mean conferences, it could mean seminars. It hopefully means feedback from the users on what they need and the generation of new research activities to fulfill these needs or to search out the information. It means an advisor talking to the user "one-on-one", determining the user's needs and then using the university resources to satisfy these needs.

It is the combination of these three functions, (research, education, advisory services), that makes the program unique.

You say universities have always done that. Well, they say they have and they try to do it. The Land Grant Programs are held up as a model and have been pretty successful. However, universities have perhaps slipped backward in the last twenty years. I think that's one of the reasons they're under fire for paying less attention to the user and the public who they ought to serve.

Sea Grant is forcing the universities to face real life problems and real life opportunities, and to do it in a realistic way. Accountability of the program; not

just to our administrators, not just to our Board of Regents or to our legislature, but to the public at large is important; the user, whether a citizen, government agency, regional commission or organization, or industry. We're accountable to all of them.

Sea Grant has been in business about 10 years and now has 25 full fledged institutional programs within coastal states and another half dozen or so embryonic programs. Of the 25 full-fledged institutional programs within coastal states and another half dozen or so embryonic programs. Of the 25 full fledged institutions, twelve have been designated Sea Grant Colleges. All this means is that they have, "in the words of NOAA", succeeded in putting together the functions of research, education, advisory services and have a commitment by the institution and state to support this activity administratively and financially.

The Great Lakes are specifically named in the Sea Grant legislation as part of the oceans and part of their program and there are four Great Lakes Programs at the present time; Minnesota, Wisconsin, Michigan and New York. We are looking toward the addition of Ohio, and although there have been talks with the Illinois people on Sea Grant, I don't know where it stands at the moment. Indiana has a very minor interest at this time, I understand, and so does Pennsylvania. But the four that exist now have already formed officially a Great Lakes Sea Grant Network. Our University presidents have signed a treaty and we are determined to cooperate. We are engaged in a cooperative programming and interchange of problems. We are looking at advisory services needs and opportunities in the Great Lakes Region; trying to coordinate our programs so that we're not all doing the same thing in different places. Rather one state will be expert in one thing and will do it across state lines, another state will have an expertise in a different area and they will move back across the state lines and that way we'll make our dollar go a little further.

Sea Grant Programs have a great responsibility. Unfortunately, it's a very small program as national programs go. The whole national budget is \$30 million dollars. One of the requirements is that the institution must come up with 50% of the federal support of the program. This results in a state-federal partnership. Some of the local non-federal support can also come from industry as it does in most cases. Even so, the program is relatively small. It certainly can't tackle all the problems of the Great Lakes. It doesn't have the capability of addressing all the problems, answering all the inquiries, or serving the entire public. It does what it can in certain areas.

In addition, it is a point of contact with the universities. For example, if one of you comes to the University of Wisconsin and wishes to find out something about soil samples at point A in Lake Michigan, I doubt very much if you know who to call. You might call the University operator and say you want to find out some soil information. She'll connect you to the Soils Department who works on farm soils, and won't know anything about Lake Michigan.

You can call the Sea Grant Program who will direct you to the person who has the information or will say that the University of Wisconsin does not have that information and maybe Illinois or Northwestern has it. We have access to all intellectual resources of the university and I think that's an advantage. It enable people to get in to university and use the resources.

HISTORICAL INFORMATION ABOUT LAKE MICHIGAN

Ross Horrall

University of Wisconsin

This paper was incomplete at the time the editing was finished due to recording problems. It will appear as an addendum.

SESSION

IV

THE UTAH EXPERIENCE

"INFORMATION IN PROGRAM PLANNING AND MANAGEMENT: THE UTAH EXPERIENCE"

Donald Nielson
State of Utah Science Advisor

When I was asked to participate as a speaker at this symposium two questions came to my mind. First of all, how could any experience from a semi arid state like Utah help out in a coastal context? (The closest we come to water is the Great Salt Lake which isn't any water at all, but a mineral resource). Secondly, what does "a new kid on the block" say to anyone? (I've only been in this responsibility for a little over two months). It became apparent that the most useful function I could perform would be to offer insights from a problem - solving viewpoint.

First of all, I'd like to give you a little background so you can work some problems through with me. Utah is primarily a republican state politically but the people tend to elect a man on his own merits instead of following strict party lines. At the present time we have a legislature controlled by one party and a governor representing the second major party. This offers some potential problems.

There has been a State Science Advisor in Utah for several years, but the position was only part-time in nature. This situation was changed recently with the establishment of a full-time position and the relocation of that position to the Office of the State Planning Coordinator, which is the hub of activity within Utah state government.

Utah also has a State Advisory Council on Science and Technology which has historically carried the prime responsibility for scientific input to the decision-making process.

Another potential problem area is that the state is divided into seven multi-county associations of government. These divisions were made in part because of regional problems, but mostly because of political similarity. Some of these associations have banded together to fight the state and federal governments. This gives you a picture of the government organizational structure in Utah.

Into this cauldron of political activity and incompatibility a new full time science advisor was hired with almost no direction from the governor. A preliminary analysis of the situation led to a conclusion that there were two types of problems. The primary problems were very intense and needed an immediate solution, or at least, an immediate start to find solutions. The other category involved secondary problems. These are as real as the first group, but they were a long time in building up and it is going to take a long time to solve them. I've been in the position for two months and I'm already four years behind so you can tell where we're going.

The prime responsibility of the science advisor is to translate scientific information and have input for both the governor and the legislature. This is different than most states where you have a group of legislative research analysts who serve the legislature and then you have someone in the executive branch, usually in the planning office, who serves the governor. We have been fairly successful so far, but mostly it's a process of getting acquainted with them and letting them know that you are able to offer objectivity.

The second problem was to relate some of the university activities to state problems. This was really greatly assisted by the way the state of Utah funds its Universities. When the state says that we'll fund those problems most actively that are related to state needs, that serves as an incentive for the university to establish a dialog with the government.

The third area is probably the largest in the state, i.e. energy related and resource problems. In response to this area of concern, the last legislature established an Energy Development and Conservation Council. The Council is composed of perhaps twelve to fifteen individuals representing a variety of environmental groups, industrial groups, the academic community, as well as some state legislators, elected political officials, the mayor of Salt Lake, and some of the commissioners in San Juan County. The members of the Science Council provide technical assistance to the members on an as needed basis. They're a little short on technical skills so we in the Science Council try to assist them in that area.

A fourth problem that came up was one of the newly formed Utah Energy Consortium. This is a consortium of three major universities in the state, which is really a contract agency with the Utah Department of Energy to do research work. This is the mechanism by which we are able to have a dialog between the university and state government. Along with the other problems we have in the state, the Vitral Uranium Company processed uranium ore in the early part of World War II and the processing resulting in a huge tailings pile that is located in the middle of metropolitan Salt Lake City. The U.S. Department of Energy has now recognized that this is a problem it has some responsibility for and is working with us to try to solve it. Another facet of the nuclear disposal problem is that the Nuclear Regulatory Commission would like to use the southeastern part of Utah as a nuclear waste repository area.

The sixth problem listed was the State Research Program prioritization. Nothing had ever been done to bring together all the research problems deemed as important by the various state agencies and set them together in some orderly fashion. If this were done the governor could prioritize them for budgeting purposes.

The group of secondary problems began with the utilization of state resources. Utah is an energy rich state, but how can that be exploited in terms of the development of the state. The second was the local government unit issue. The lack of communications between the state and local governments is also a problem here because the Science Advisor is supposed to assist them. Although they don't want any help so we're trying to work out a relationship with them.

Third was the legislative attitude toward the general research programs. The state receives revenues from the leasing of federally and state owned land for mining purposes, part of which goes to the state University to support research.

There was some concern on the part of the state legislature regarding the expenditure of these funds so the Science Advisor's Office was directed to make some recommendations as to how these funds should be spent.

The fourth problem which has been building for at least twelve years, is the lack of communication between the executive and the legislative branch. So we're going to start, at least in the science area, and get them talking together.

We have the following technical resources available to us. As I said, there is a Science Council composed of high level technical people; very responsive and very knowledgeable in their areas and also very desirous in doing something with the state. The expertise available in the various state departments is a second resource and one which is often under utilized. The universities with their people in all fields are also good resources. Utah has three major universities that are within 100 miles of Salt Lake City. We have innovation groups composed of people who are technically trained and very innovative who band together and use their offices as the means of technology transfer. We also have technical societies which have information available to help us out. Personal contacts developed in various fields also serve as technical resources.

Information systems such as those that we have been talking about today are also important. We are fortunate to have a full-time librarian so that access to these information systems is available. The university is very cooperative as far as this is concerned because they have on-line computer access to many of the national systems.

Based on a preliminary analysis of the various areas of concern it became apparent that the greatest service my office could perform would be to become a technology transfer agent. This type of function would provide the greatest degree of assistance in solving problems. As an example of this I would like to show how this has functioned in the brief period since its adoption.

One of the major areas of developments in the State of Utah is its energy resource. To develop our energy resources, first of all we needed to know where they were. We worked with the Utah Geological and Mineral Survey and compiled a map of resources. We utilized this approach because we found that with our people, it's easier to get them to look at a map than read a report. The map identifies areas of coal deposits, potential geothermal areas, tar sand areas, oil fields, gas fields, and oil shale resources. The map also shows the uranium mines that are now active or have been surveyed. To make this a little more complicated, but really more readable for those concerned about energy, we also put in all of the existing gas and oil lines as well as the powerlines that criss-cross the state. Another valuable piece of information that is included is the fault zones so we indicated where the shifts have occurred. This has received wide acceptance by people because they can tell at a glance where you're talking about a specific resource. Also, in terms of power plant siting, if you have this map available it is easy to see why someone wants to locate a power plant in southern Utah because of the extensive coal deposits and the accessibility of cooling waters from the rivers.

Another activity my office undertook, with the assistance of the Four Corners Regional Commission, was to compile information about energy-related research, either in progress or recently of which were in the national system, really wasn't current enough to do the kind of job that we needed to have done. This information would be incorporated into a commercial Regional Energy Information System (coordinated by Los Alamos Scientific Laboratory).

The staff members of the Council conducted the study in two parts. First, we analyzed the legislation that provides for the establishment of a federal energy information office and federal policy that may affect the operation of such an office. Second, we learned about the functions and future plans of existing federal systems for maintaining information about energy related research. The critical point to keep in mind regarding these two parts to the study is the distinction between the information about energy production, and about energy-related research.

We found the bills to which we were originally directed did not provide for the establishment of new information systems and no such systems were contemplated by any federal body we contacted. We found that the two best sources of information were the Smithsonian Science Information Exchange and the ERDA office down in Oak Ridge. But in compiling the information that we found in the state of Utah, we located about 130 reports that weren't listed in either system, but which provided essential information to assist the state make some energy-related decisions. The information was incorporated into catalogs describing energy research and development in Utah, research funding, and energy researchers.

In this case the information didn't get produced and then hidden, it's still being used to assist the Energy Council in the technology phases of their planning and problem-solving function. The science Council is required to assist them with technical input so they can perform their policy-decision function.

Another topic that might interest you is the Energy consortium organized by three Utah universities to contract with the U.S. Energy Research & Development Administration. When representatives met with the Energy Council, there was a communication problem between the academicians and the Council members. This problem was alleviated by the addition of my office as a discussion facilitator. The universities are now studying the socioeconomic effects of some of the coal production. They are also in the process of siting a power plant for the Intermountain Power Project (IPP). This has national significance because the IPP group selected a site and the state said it was unacceptable and the state's decision was sustained by the Secretary of Interior. During the attempt to locate the best sites, the Secretary of Interior decided on a particular site that had been selected by a local power company to locate a plant which would produce power for the Salt Lake area for the next 20 years. The site wasn't acceptable to the state. It's a problem that requires technical information, environmental information, some handholding and a willingness to negotiate to solve the problem.

Another concern in the energy area is the need for information that would help decision-makers in specific areas evaluate the resource potential. As an example, in one corner of the state both uranium and coal resources are available and they would like to know how they can best mine the coal. How does it compare to the other coals in the state? Is it feasible to work with someone there or are we going to be over shadowed by another area?

In response to these problems the Science Council is preparing resource reports on natural gas, coal and petroleum. Reports will also be prepared on uranium, tar sands, shale, and on geothermal energy. This is what we hope to accomplish within the next year.

Another big problem we have is interaction with the Associations of Government. Parts of Utah are suffering from urban problems outside the scope of experience of the Associations, whose members are rural by inclination.. There is also a problem of gaining credibility before suggestions from outside are heeded or even listened to. Since the Science Advisor's legislative mandate is to help the Associations of Government we must take the necessary steps to gain their confidence. No matter how competent you might be in technical matters, if your advice is not accepted it is useless.

My experience to date has shown me that the information systems with assessability and rapid retrieval are necessary, but they have to be coupled with personal communication and a high degree of cooperation. With that kind of cooperation then proper information can be provided to decision makers and the problems can be solved. We don't have any magic cures but at least we're heavily involved in the process.

SESSION

V

GROUP DISCUSSION

SETTING THE STAGE FOR DISCUSSION

Russell Davenport
City of Chicago

During the previous sessions you have heard a number of presentations describing problems and needs associated with the accessibility and use of environmental information. This session has been organized to allow the rest of you an opportunity to be heard so that your concerns and suggestions can be incorporated into the proceedings of this meeting.

The goal of this group discussion session is to come up with some suggested ways and means of dealing with the multi-faceted problem of gaining access to environmental information about Lake Michigan. To accomplish this, each group will be asked to respond to seven questions that have been prepared to facilitate and focus the group discussions. The questions are:

- (1) Who would be the users of information services about Lake Michigan and what are their particular needs?
- (2) How can a potential user select a system or service to fit his or her needs?
- (3) How can an individual get the most out of a system or service once it is selected?
- (4) What type of information shouldn't you expect to get from a system or service?
- (5) How can you obtain the information you are unable to obtain from the service or system?
- (6) How can you get information into a system correctly or how can you establish some degree of quality control?
- (7) What do you feel are the emerging trends in environmental information about Lake Michigan?

Each question has been assigned a number, but that does not mean that they should be discussed in numerical order. The first exercise each group should undertake is to establish its own set of priorities for discussion purposes.

When the general portion of this session is reconvened each group will be asked to articulate its responses to the seven questions posed above. I am sure that each of you have experiences to share and these experiences quite often will govern how you respond to the discussion questions. What we would like to obtain from each group is a consensus as to the concerns and suggested solutions.

GROUP 1

George Benda, Edward Cameron , Leonard Crook, Donald Nielson, Carol Unzicker

The first question we dealt with was #5 "How are you able to obtain the information you were unable to obtain from the information service?"

Our group thought it was important to talk with the pertinent people of the federal and state agencies and research labs as opposed to just identifying them. We discussed the desirability of directories - directories of current research, directories of special libraries and professional societies, technical societies, industrial associations. Program descriptions and agency budgets in annual reports of agencies was also deemed an important source of information. Another conclusion drawn by the group was to look at pertinent conference and symposium proceedings, or to attend conferences and symposiums.

If you have a lot of time you can start interviewing authors, going to local municipalities and interviewing agencies responsible for specific areas as well as special interest groups interested in these areas (to obtain as much information as possible). Now if you have a significant amount of time you can really perform a detailed search. You can read all the reports including the footnotes, where you'll find a wealth of information, and recent professional papers. You can also review requests for proposals to see what is going to be done in the field. These are relatively difficult things to do and should have lower priority. As a last resort we said that you can perform the research yourself.

The second question we dealt with in some detail, was question #6, "How can you get or input information in to a system correctly or how can you establish some degree of quality control?" We broke that into two parts; how do you make sure that what you're getting into the system is correctly represented and how do you control the quality of what you put in? Our main point in this entire question was the need for a high quality staff. There was no escaping that point. So that was our first point and that is reflected in both input control and in quality control.

Among the most important aspects in terms of correct representations is to double-check the input. To verify input with researchers or the person who is supplying it, to let them control what went in to some extent or at least to review what went in. Other concerns were less crucial but still important.

In terms of the quality control input, we identified three items that we think are crucial to quality control. First the high quality staff; second, some quality control procedures, (rules of operation for the staff to follow that are fairly uniform); and third, motivation.

We discussed motivation for quality of input to a great extent and we came up with two points. First, one way of motivating people to put in quality information was to use a profit incentive, or to let information services be developed in the private sector where there would be a profit motive to produce information. They produce lousy information they don't get paid for, they go out of business. The second point

was to see that the audience for information services has a say. We also came to the decision that the researchers themselves would have to play a part in making sure that input was of high quality because of their vested interest.

Of the second importance would be the use of a panel of experts to screen materials together with a standardization of parameters and format. We thought it was very important to include a methodology with any data that was collected so that we knew how it was collected. As a third priority, we concluded that a set of general standards for the whole industry would be helpful, both in terms of communications among systems and in the use of descriptors and key words. Those were third priority not because they're not important, but because they are nearly impossible to accomplish.

We spent a good deal of time on the first question - "Who would be the users of information services about Lake Michigan and what are their particular needs?" Frankly we didn't focus on Lake Michigan very well. We focused instead on doing some general categorization. We categorized users into a series of lists. Researchers included both public and private, management personnel, planners, policy planners, and research administrations among many. Research managers was a separate group. Designers the general public consumer, educators, and librarians were also identified as separate groups. We gave up on prioritizing users and needs altogether. It was too complicated and we decided that the needs which we listed had a different meaning for each of the user audiences. The recommendation we came up with here was to prepare a set of brochures directed to specific user categories. Brochures specifically directed to those audiences would inform them of some of the information services so that every audience could pick up a brochure and say, "ah, I'm a research manager," and get some idea of what was available in terms of information services.

We saw three types of basic data needs; the historical perspective, base line information and technical information. We also saw functions which will, serve all the categories of users, but is not really thought of in terms of information services right now. These could be described as programatic information, projects, programs, budget descriptions and institutional information, such as: who does what and where are they located?

Rules and regulations used in the administration of laws is another possible function. You could spend your life incorporating those into an information system and never finish, but it would be very useful if you could just punch a few buttons and get out the regulations for different governmental units on specific subjects. Methods of practice and philosophies of planning would also be helpful. For example, what do river basin planners in this region have as a general tendency. Also, executive mandates, legislative mandates, legislative voting records, and others analogous information could be very useful if it was accessible to at least several of these audiences; especially the policy planner.

Another focus we had was simplified mechanics for information system users. Improved access better quality control, systems for different categories of users, greater percentage of available information going into the system - things like that.

And finally one major point was the prospect of aligning user expectations to system capacity. I think that's a crucial point of concern.

Next we dealt with Question #3 - "How can an individual get the most out of a system or service once it is selected?" We put it into a step by step process. First, work closely with an information specialist librarian. Second, define your needs accurately. Third, educate yourself about availability, capability, structure and utilization of whatever systems you have in mind so you know what you're doing. Fourth, acclimate yourself to computer technology. (People are uncomfortable with terminals and with printout sheets etc. and it takes time to acclimate yourself into using those things). Fifth, develop an understanding of key words and their use. (You have to understand that key words mean different things from the words used to phrase your question and be comfortable with that). Sixth test operate the system you've chosen with a simple question. (Run it through the system knowing what the answer is going to be and if you don't get the right answer then you know you've done something wrong so you start over until you get used to the system). We have a general suggestion for reducing the mystical qualities of computerized services. Print the data on a standard 8½ x 11 sheet rather than on standard computer printouts.

We dealt with Question #2 after that - "How can a potential user select a service or system to fit his/her needs?" "We developed a suggested process for this thing. The first is to consult or hire an information specialist. Then work with this specialist in defining your information needs. Then you establish a budget for information searches. One of the big problems is knowing how much to spend and also knowing how much you have to spend.

After you've established a budget, we thought it would be best to educate yourself about what each system can provide, then confer with your peers as to how they use information systems so that you can have an idea of what kind of benefits they've gotten from them. Then you can move ahead and confer with people who have used those information services in which you are interested. Then you have to formulate your question which means you must align your vocabulary with the systems' vocabulary. (This is the problem of key words we talked about before).

Then align your needs with the system capabilities.

The next step was suggested as an innovation in information service selection - a benefit - cost review of the kind of information you're going to get from the research you've done, the days you've spent talking with experts and talking with friends formulating your question. Are you going to get results that are worth the money you're going to put in to it? Then, select the system or not based on your review.

Also we listed a few things not to expect. We didn't put them in any priority because they're all equally relevant. You can't expect analytical interpretations from computer information services. In general you can't expect the details or the specifics or the data from a report. You can expect only abstracts and things like that. You cannot expect solutions to be printed out on the page or expect better information to come than what was put in. You can't expect all the information you need and you should not expect more than a reference service. You will likely receive a bibliographic section to work from or abstracts to work from.

The last question we dealt with was #7, "Emerging Trends". We prioritized our findings in to groups in terms of relative importance. The most important was the trend toward environmental health as a subject of research; human ecology being the area that a lot of money is going into right now. Second priority was to focus on applied rather than basic research, which often turns out to be a collection of base line data to support applied research. We also see here an increased tendency towards a system of accountability. You can only do things if you're accountable for them which leads to more precise and detailed measurements which takes on another characteristic - a realization of geographical and temporal specificity of data. Third priority was a more educated public. We are confronting a more educated public and the more information that is available the more educated the public has become. There is a greater appreciation both in the public and in the research and policy communities of the ecological interrelationships that they are confronting which means a change in the kinds of information you can expect to find in the commercial services. In addition we see changes in public attitudes and behaviors as a result of increased information. Here we mean, for example, the decrease in consumption of lake fish such as salmon and trout. The fourth priority listed is increased interagency cooperation and increased intersector cooperation (meaning industry and public, public and private sectors cooperating), a regional conception of the problems, and increased international cooperation; all of which will impact information collection in a variety of ways. That's basically what we covered in our session.

GROUP 2

Edward Hanses, Wes Halverson, Suzanne Taintes, Stuart Ross, Philip Reed

We were quite fortunate in having a group with rather diverse backgrounds. This led to a great deal of discussion and what we tried to do is come up with "bottom line" information. We thought all seven questions were important and they seemed to flow in a rather logical manner. One of the things we tried to keep in mind was to focus on our objectives as to Lake Michigan. (What are the needs, what users do we have, how can we get systems going, and what do we feel is going to result?)

Starting off with Question One, we talked about who would be the users of information services. We identified six groups of users. There were the general users of the lake, the general public, planners, commercial interests, researchers, riparian landowners, and special interest groups. We figured that probably 90% of the people who would be interested in Lake Michigan information would fall into one of these groups.

In terms of the types of information that these groups would be interested in we felt that the general users of the lake would probably be interested in non-technical types of information. Planners would be interested in both technical and non-technical information. Commercial interests probably would need non-technical; researchers, the technical; and riparian land owners and special interest groups, once again, the non-technical. We felt the needs would vary depending on the type of individual and groups we were working with at particular times.

The second question was, "How could a potential user select a system of service to fit his/her needs?" We reached a consensus that the systems or services (in this context) we were talking about are information systems which are either computerized or cataloged in some fashion.

We felt there are five main steps to take in the selection process. First, the information needs must be identified. Unless you know what you're looking for, where do you go from here?

The next step was to define the objectives and the scope within these needs. We have the needs identified and know where we're going, we want to know what the objectives are and to what degree do we want information? At that point then we begin to target in on the potential sources of information.

The third step is to locate potential information source. In accomplishing this step you would ask them what kind of information can you provide for the problem I have in mind. From here you would proceed to the next step which is to obtain and review the information provided by the service, and then revisit the second step if necessary to satisfy your needs. It would probably make sense here to start off on a rather broad basis and keep narrowing down until you get the scope and detail you desire.

The next question was, "How can an individual get the most of the system once it's selected?" We felt that in this regard personal contact with a particular specialist or information transfer specialist, librarian, whoever you're talking to was extremely important. Personal contact is best because the feedback and the interaction involved is extremely important.

The fourth question was, "What type of information shouldn't you expect to get from a system or service?" We didn't feel this was too important - actually we had only one comment. We felt that unpublished information has no way of getting into an information system. Therefore, you're not going to get anything out of a system of this type.

"How can you obtain the information you're unable to get from a service or system?", was the fifth question. We only had two points here but had a great deal of discussion. Our first suggestion is to seek the aid of knowledgeable and experienced contacts. We mean that after you've selected the appropriate information services you may still have problems unless you make your selection carefully, and you still find that they didn't answer all your questions. We felt that talking to local contacts or specialists in the field was the next best course of action.

We felt that it would be more useful to develop a broad overview of the topic or concern as a first step so that by the time you get to the point where you're talking to these knowledgeable specialists, you can ask better questions and get better answers from them. From these contacts hopefully you can come up with additional information. This leads you to the point of initiating original research or studies by consultants or contractors, if this is necessary. At this point there might be sufficient information for a particular project that you have in mind at a given stage. For instance if you are working on a preliminary type of planning report you can make do with a limited amount of information. At the point where detailed design or in some cases even intermediate types of design is necessary you may have to go out and get some additional information. At this point by contact knowledgeable specialists, for even though they might not have the information, they may identify holes or gaps in terms of information and this is important. Sometimes identifying data gaps is as important as having the information available because if you really exhausted all of your sources you know exactly where you stand at that point.

The sixth question we dealt with was, "How can you get information into a system correctly, or how can you establish some degree of control?" We felt that this meant getting the correct type of information into a system in a correct manner and how you can establish some degree of control. Our suggested procedure here involves verification of data input, screening the information, editing the information, and peer review. We felt it was very important that the public and peer groups look over this information before it goes in the system because once it was in the system, "garbage in, garbage out." If you don't get good information in there you could come up with erroneous answers later on. There may be ways you can verify the quality, but if you didn't have good information you have a problem.

"What do you feel are the emerging trends in environmental information about Lake Michigan?", "was the seventh question we addressed. We listed six areas that we felt were rather important. We felt that there is an evolving realization of public value of Lake Michigan. In other words the general public is beginning to perceive that it is an environment that must be cared for. There also seems to be a greater collaboration and cooperation on source information and data information such as we heard yesterday and today. There is increased and improved lakefront planning underway and also there is increased interest in recreation planning. The recreation needs and values of the lake are getting much greater recognition than they have in the past. Water quality is important; being the basis for delimiting uses, whether habitat-oriented or use-oriented.

There is a great increase in water quality monitoring; 208 program and programs of that nature. These programs represent the trends.

There is also a much greater interest in Lake Michigan as a resource. The public is interested in this resource, they realize something should be done and I think it behooves us as professionals in planning and resource management to take these interests and build upon them.

GROUP 3

Barbara Arnold, Berttram Woodland, John Wrobel, Eunice Choo, William Hendrickson

Our discussion of information users led us to the same conclusions as have already been covered, so I won't repeat them here. In terms of user needs we identified four groupings. First, we have a need to gather data and to tailor or translate the data for users. We need a "who's who list" and we need to structure information. Second we need to develop better controls over the generation of information; standardizing data collections and methodologies. Third, there is a tremendous need to know what is available. We identified a need for special libraries or for special indexing in bibliographies. Fourth, we need better mechanisms for handling information. A couple of the people said it is very difficult to try and find documents that are in your collections. It's very hard to gain access to them even when they're on your own shelf.

We grouped Questions #2 through #4 together. In terms of what type of information shouldn't you expect from this system, there isn't any one system or source that can provide data for everybody's needs and no one source could ever have all of the data in it.

In terms of how can an individual get the most out of a system or service, we discussed the converse. Instead of putting the emphasis on the information user we asked how could the services be set up so that they could best meet the users needs. Of foremost importance here is a specialized or organized index or collection, maybe that would have to be a computer base, but we really were not sure about that. One suggestion is to maintain system flexibility so that if this system was to be computerized then it should be accessible to information specialists but also through electronic medias, via telephone network or something like that (so it would be available to remote sites).

Questions #5 and #6 we quickly dismissed by saying if you have an information system, you use an information specialist, and you still don't find the information; you figure that it doesn't exist.

Under the sixth question, systems are only as good as the person who puts the information into them. Maybe statement of qualifications could be added to the data that is put into a base. It will have to remain the responsibility of the user to evaluate the information that is in a given system.

Our major focus was the fact that with continually growing technological advances there will always be an increasing demand for more specific and more detailed information and because of this you will constantly have to update data and that will be an endless effort. Data gathering is an expensive process and perhaps as these costs increase there will be more and more pressure on the data gathers and data generators to disseminate their information or see that it is maintained by someone else.

The group felt that environmental litigation will probably continue and that legal decisions generated from these actions will be important sources of information for the future. The more people that are involved in the planning process the more the need for information will expand as will the different kinds of user groups with their different kinds of needs.

GROUP 4

Caryl Terrell, Peter Ryner, Choule Sonu, Doris Soubllette, Clifford Risley,
Daniel Injerd

We only addressed Questions 1,5,6,&7 in our deliberations. Probably, our discussion of trends will be one of our most important inputs to this symposium.

Our discussion of Question #1, which is "the users and their needs," led us to suggest a study for somebody to fund. We set up the matrix and decided who some of the users were. Most of these have been identified previously, so I will only mention the ones who haven't been emphasized before. There are a great number of decision makers. There are appointed officials and elected officials; not just the state legislator and not just the heads of state or federal agencies who have to make decisions - a variety of bureaucrats.

Also of import here is the increasing role of public agencies in providing information to the public. We also included the media and lawyers.

We chose to divide up information rather than information services. We took data in the broadest sense and included everything from the standards adopted by an agency, the regulations that might be printed in the federal register, all the way through to the data bits which might be somebody's chemical analysis of a small section of Lake Michigan. We also identified a full range of other things including processed data, analyzed or interpreted data, and simulation among many.

Our discussion of information gathering brought some interesting conclusions. People thought about what they themselves do to uncover needed information. The best approach is to develop personal contacts with professionals in the field about which you are concerned. You should also look at the full range of publications to use in identifying the professionals including directories of personnel, of institutions that are involved in an area and then of personal libraries. There is also the whole system of libraries and interlibrary loan facilities that are available. The possibility exists of having to initiate research, perhaps a survey or some other preliminary study. Another way of getting information is to present ideas to pertinent professionals and get ideas and feedback from their review. Another possibility would be to extract information from proposals that come across your desk or requests for proposals or requests for quotations or bids). These generate ideas that might not otherwise be available.

Another suggestion would be to browse through the book shelves of other agencies and to chat with the staff of these agencies with pertinent responsibilities.

The common thread through out our discussion was the need to gain experience in identifying and using sources of information. The more experience you have the more likely you are to make a wise choice about how to get information for your own purposes. We felt that people should continually scan information sources and not wait until they have a need. People in fact should be building a reservoir of information for future dates and needs. Finally, you should be selective about your scanning of sources.

In terms of evaluating information quality the group, rather than answering the specific question posed, felt that they had some experience to share. Some observations of value here are that time and cost are a constraint on the amount of the evaluation you will perform; but our hypothesis was that people spend too much time collecting data and not enough time evaluating how useful it is. In terms of screening information we agreed with a point that was made by Leonard Crook yesterday. Probably a low level person does the screening rather than a senior staffer. It is our feeling that the screening should be accomplished by a high level person and that the screening should be in terms of the task orientation, professional background, and method of making decisions. This might be reflected in your personal style or that of your institution. You should try to initiate a screening and a rescreening process by people from different disciplines because of the different perspectives that people will bring. We also suggested that feedback to information generators would be a very good source of evaluation.

Personal contacts would also provide a source of evaluation of the quality of the materials you have. Recommendations as to what is good and warnings about what might be bad or what should be used with caution are pertinent here. Ways of looking at a report to find out how good it is. (how the data was collected, what collection techniques, were used, methods of analysis, the design (both spatial and temporal) of the data that was gathered, your own experience, the amount of documentation in the reports, and comparative analysis of the information with similar types to see if it compares favorably or not) are also useful tools to develop. Professional instinct seems to be very important and there is also the potential for personal verification. For example, if it is about a specific nearby geographic area a site visit would be useful.

Emerging trends in information needs is one area that we focused on very productively. I will limit my reporting here to those trends that are somewhat unusual.

We felt that in the future there would be more collection of data and information done on an interdisciplinary basis. Information is now collected within a specific discipline and then possibly used elsewhere.

We felt that there was some concern about ways data is stored. That will affect the usefulness of data in the future. We also felt that there will be more networking of data done in the future rather than a central warehouse type operation. In our view it is less important to locate the collections centrally then it is to know where they are and to be able to access them there.

It would also appear that there will be new research skills, partly due to the way information is collected and stored. A new type of information that will be important is remote sensing such as from satellites and from low aerial flights. One of the values of this will be in combination with ground truth that will enable you to extend the data and to calibrate the data more accurately.

An emerging trend which we thought people should recognize and be able to respond to is the demand for technical information by the general public the formation of systems to deliver technical data to the general public and in formats that are understandable to the concerned public; both because there is a requirement to do this and because there is an interest in obtaining that type of information.

One feeling we had about the Great Lakes in particular was that the Great Lakes have been neglected in terms of research investments. There has been some concern that people who have conducted research in other large bodies of water such as the oceans feel that they could apply their research to the Great Lakes. We felt that there should be a warning flag here because the Great Lakes are a unique area and information compiled elsewhere cannot necessarily be extrapolated to study environmental phenomena here. There is likely to be trend towards recognizing the Great Lakes as a unique system with unique approaches and techniques that will need to be developed. Associated with this was concern that there are definite gaps in research about Lakes that something should be done about. There was also a concern that there is little money going into Great Lakes research and this leads to an equity question.

There also should be additional forums for information exchange such as this meeting, because as you can tell, the thread through these proceedings has been the need to develop personal contacts.

GROUP 5

Elizabeth Hollander, Michele Tetley, Carol Worster, Thomas Lauer

Our group represents a diverse set of public agencies - three of them federal, one of them regional and one of them local. Perhaps this gives us a unique point of view.

What came to mind when I thought about summarizing this was an experience I had at a conference that Jon Kusler called at the University of Wisconsin, to talk about critical areas data. A couple of people from Wisconsin talked about going to the state legislature to get support to pay for geological mapping of the entire state. They completed a long and elaborate presentation with overlaying maps showing how you could site power lines and all these great things you could do with this information. They got all the way through and one of the legislators asked, "what's a contour line?" Those are the kinds of things that we faced and so when we looked to the seven questions provided to us we rejected them right at the start. It didn't seem logical or relevant at all.

First, we asked if anybody had used computerized systems. One of us had and it hadn't served our needs. As we talked about that it became clear that both computerized bibliographies and computerized data banks have severe limitations because we are almost always operating under severe time constraints.

We're dealing with new buzz words. Every program that comes along has its own vocabulary and it never fits with the key words in anybody's long range bibliography.

We have a problem of too much data. What are we going to do with lists of abstracts? We need to know which is the best report that we should read right away.

If we try to use other people's data banks that are all set up for various reasons, first we worry because we don't have control over the data. Maybe garbage went in and we'll get garbage out; the best way we can control the quality is to put the data in there ourselves. In addition, it never meets your particular geographic specificity in its available form. You have to spend so much time and effort adapting it to your needs that it becomes more efficient and less costly to do the job you have to do starting from scratch.

Finally, it's not flexible enough. The parameters you need haven't been built in.

What we focused on were services - what we call "brokerage services." We talked about how information is obtained; how the user and the supplier get together and the most important source of our information is the professional network. It's actually the people we know who "know" about a particular subject or can point us to the person who knows about a particular subject that help us function effectively within the kinds of time constraints we're operating under. Librarians that we have found helpful are another resource that we use. We need to get a good point of view on something, we need to know what's going on regarding an issue that's highly

controversial. when time is not available to search the literature, you may talk to somebody from industry and to somebody from an environmental interest group who have ranges of opinions with the hope that the truth lies somewhere in between. Always be aware of who sponsored the particular study and if it's a university study, where is the money coming from, what interests are they speaking to and if you can cover your bases on a number of those you may be able to come up with something that you can use.

The other reason that we turn to the professional network is that there you can find "information disseminators" -people who by instinct and by interest communicate what's going on. I worked in a research organization and I could name three people who always told what they knew to somebody else, who always had a good idea about where to go to get a piece of information. They did that very well and I think anybody who has worked in a research organization or any organization knows who those people are and that they are invaluable.

We felt that we should put resources into making more of those kinds of people available to all of us. For one thing, that's how you get access to all the unpublished material that turns out to be more useful than all those lists of published materials. That "gray literature" often proves to be extremely useful and that's never on anybody's list. So we talked about how you would put your resources into information brokers.

You would put money into people, you'd put it into telephones, you'd put it into information hotlines, you'd put it into conferences like this, they wouldn't be a luxury they'd be a necessity. In fact, all of us go to conferences looking for people who "know." And there's another nice quality about this which is that quality control is built into a professional network. We all know who is doing the really good studies, we also know who is doing the really bad ones, although nobody would ever write it down anywhere. The ones that are underfunded; where the technique has been tried and it hasn't worked out; the beginnings of a new idea, but it didn't work this time and maybe it will work next time - those things are known when you start to ask people who know what's going on.

Public agencies are both producing material and using material - it's a back and forth kind of thing. You turn to the broker and say, "look what can you do for me about this and here she calls you back two weeks later and asks what you know about that, and it's this trade-off that keeps people in communication. There's a built in motivation to be part of that system - you're getting out of it as you're putting into it.

One nice spin-off is that the person who is answering these questions right along begins to build up an understanding of the unanswered questions. Where should the research money go. "This month I had ten inquiries on this subject and nobody seems to know." "Somebody ought to fund a project to look into this particular thing, because there are all these people who need to know it and there are no good answers." So these are the kinds of things that should be emphasized.

We also saw an increased interest in applied research and people who are were becoming translators between the scientific/technical information and the policy-making. Extension services appealed to us because they provide ways of getting information to the public. We made a list of users which is very similar to everybody else's list. I think there were a couple of groups we felt were very poorly served and one was the public and another was state legislator.

SESSION

VI

INFORMATION BROKERAGE
AND NETWORKING

INFORMATION SYSTEMS AND SERVICES THAT WORK

Michele Tetley
Office of Coastal Zone Management

I would like to talk to you about "APES" this afternoon. An "APE" is an All Purpose Employee. My experience has been that your best information specialist and your best "librarian" is an all purpose employee.

When you start looking for a system or for a set of services for Lake Michigan you should have in mind the type of people you want to have run the system or brokerage or whatever else you set up. Information dissemination is a very personality-linked function. You either have the instinct for it or you don't. It is very important for the person to be involved in every activity within the organization including planning, policy, budget making; the whole spectrum of activities that your organization is involved in. This gives the people an idea of what is coming down the line and allows them to plan for issues that will emerge as a result of the policies that are being made. Historically, a lot of librarians have suffered under the treatment of having been stuck back in the library, only to be seen when information was sought. If you really want a service that will answer your needs, involve your librarian or your information person in the every day activities. Then they will understand what you are talking about when you come to them. Language is definitely a problem.

We spoke earlier about the "buzz words". All the resource planning and management activities burgeoning around the country all have their set of "buzz words" in the form of new language. Every new piece of legislation creates new language that we have to work with. A librarian is going to be much better prepared if she is in on the conversations and learns the language.

I feel that one of the strongest roles that I play within my organization is as a diagnostician. I am able to diagnose their problems when they come to me and I can tell when I have somebody brand new in the field. When they come in with a problem they think they know what they are asking, but they don't. In cases such as these I often spend half an hour or more breaking their request down into component parts that I can get out of the system. A librarian is going to be much more capable of doing that if she has been involved in the discussions of issues and policies.

I think that you have to be careful when you set up a system. For example, the group in which I was involved with was more interested in services than in systems. There are a lot of systems around and what you need to do is to network them. You also need to have parameters in setting up a service or system. You have to be careful that it is not too comprehensive. You can't be all things to all people or you will lose the focus and you will not have any expertise on the staff. For example, it is very difficult to stay on top of all of the issues that we are involved with in coastal zone management. When you talk about the "environment" you have the same problems. We are involved in the socioeconomic and political ambiguities inherent in any policy. It would appear that all of your environmental areas are getting into the socioeconomic and cost-benefit analysis types of things.

When you decide what you need in terms of information be sure to be discrete enough so that it is accomplishable. It is very easy to dream of the sky but you will never get there.

You will also have to decide whether or not your services or your systems are going to be issue-oriented or user-oriented. The outcome can be completely different. I tend to organize my collections and service around the users and the issues kind of follow. You will find that if you design a system or service around a couple of issues, you will find yourself in a couple of years left by the sidelines because things are changing rapidly in the environmental fields. You have to establish a system that is flexible enough to change with the times.

We talked about networking in our group; piggybacking upon existing systems. Set up a brokerage if you will. There is a lot of information out there. Directories are generally useful, but I find that I do not use them that much. This may be because a really good directory is so big that it takes more time to use it than it does to make two phone calls.

If you concentrated your efforts on hiring some good people who make it their business to know what resources were available within the region and around the country it will be far more economical than initiating new collections or new systems.

What you will find in the brokerage approach is that there are some data and information gaps, and it is possible, depending on your resources, to fill in those gaps. There just isn't money around these days to start up new collections.

One problem here however is that information services tend to be at the bottom of the budget. When things tend to get tight they are the first thing to go. It is often harder to get rid of people. If you are putting funds into people and phone lines, chances are that they will stay around. A number of programs have been developed, for example, where agencies have put together fancy data programs necessary or capable of responding to the agencies' needs. What happens in such cases is that the efforts will be funded for two years and then run out of money. Then no one can access the data within the system because the computer time is not available. It is better to put your energies into utilizing what is already out there. It should be made as simple and as streamlined as possible. Some of the previous presentations sounded complicated. Perhaps because as a librarian I don't mentally go through all of the steps involved.

From my own perspective I would suggest that you refrain from formalizing procedures too much. The minute you formalize it it becomes inflexible and cumbersome. It also becomes more expensive. Somehow, the more informal a system is the cheaper it is you are more likely to be able to utilize other people's services, because they are not written into your budget and generally disappear into your overhead. Such people don't often mind one or two phone calls a month asking for help. The minute you formalize a procedure you also get asked to justify it. It is difficult to justify something before you have done it. For example, we are presently trying to establish some regional information centers around the country that will basically provide brokerage capabilities. Management is telling us to give justification such as: who would be using it and how often? We have had to tell them that we aren't able to determine that yet until the service is tested. The management then says that we can't fund it until those questions are answered.

APPENDICES

APPENDIX A

Group Discussion Notes

The following are a set of questions that are to serve as the basis of the discussions during the second day of the Lake Michigan Information Symposium.

Question 1 - Who would be the users of information services about Lake Michigan and what are their particular needs?

Group 1

Users

- | | |
|-----------------------------------|---|
| 1. Researchers (Public & Private) | 3. Research Managers |
| 2. Planners | 4. Designers |
| (a) Administration | 5. General Public (Consumer) |
| (b) Management | 6. Educators |
| (c) Policy | 7. Librarians and Information Specialists |

Needs

- | | |
|---|--|
| 1) Simplified Mechanisms for Information System USER (Efficiency of Retrieval, Low Cost, Simplified Access) | 8) "State of the Art" Reports |
| 2) Information on the Availability, structure, utilization Systems | 9) Current Research Summary |
| 3) Better Quality Control | 10) Glossary of Keywords, Descriptors |
| 4) Systems for different Categories of Users | 11) Index of Information Systems |
| 5) Greater Percentage of available Information into Systems | 12) Capability Files (Human Resources) |
| 6) Earlier or more rapid Incorporation of New Data (Timelines) | 13) Brochures on the do's and don't's of Information Gathering (Information included and excluded from the system) |
| 7) Literature Surveys | 14) brochures directed to Special User Categories for Information Gathering. |

Question 1, Group 1 (Continued)

Items New to Computerized Service

Programatic Information
 (Projects, Programs,
 Budget Descriptions)
 Institutional Information
 (Who Does What?)
 Regulations
 Practices
 Philosophies
 Executive Mandates
 Legislative Mandates
 Legislative Voting Records
 Geographical Distribution

Basic Computerized Services

Historical Perspective
 Baseline Information
 Technical Information

Other

Projected Information
 Forecasts or Predictions
 Inter-Industry Correlations
 Public Demands
 Public-Private Sharing of
 Information

Group 2

Information Users

1. General Lake Users
2. Planners
3. Commercial Interests
4. Researchers
5. Land owners (Riparians)
6. Special Interest Groups

Type of Information	
<u>Technical</u>	<u>Non-Technical</u>

	X
X	X
X	X
X	X
X	X
	X

Question 1

Group 3

Proposed matrix for emperical researcher to complete:

	Data	Processed Data	Analyzed or Interpreted Data	Simulation	Conclusions	Recomendations
Appointed Officials						
Elected Officials						
Bureaucrats (State, Federal, Local)						
Industry						
Consulting Firms						
Basic Researchers						
Applied Researchers (Sea Grant, etc.)						
Concerned Public *						
(Riparians, Environ- mentalists, Recre- ationalists, Special Interest Groups)						
Media						
Lawyers						

* Note "future trend" from question 7 : the increasing role of public information in evaluation of government agencies.

Question 1

Group 4

Kinds of Users

Researcher/Technical	Educators
Planner/Bureaucrat	Students
Governmental Agencies	Journalists
Legislators	Free Lance Writers
Special/Public Interest Groups	Information Manager/Specialists

Needs

1. Need to gather data.
2. Need to translate data for users.
3. Need a who's who list.
4. Need to structure information so others can use it.
5. Need to develop better controls over the generation of information, i.e. standardizing data collection methodology.
6. Need to know what is available. (Possible mechanisms are special libraries, special indexes or special bibliographies.)
7. Need better mechanisms for handling information.
8. Need to identify reports and information.
9. Need to be able to put your hands on information (gain easy access to information)

Question 2 - HOW CAN A POTENTIAL USER SELECT A SYSTEM OR SERVICE TO FIT HIS OR HER NEEDS?

Group 1

1. Consult or hire an information specialist.
2. Establish information needs.
3. Establish budget for information search.
4. Educate yourself about what system provides.
5. Confer with similar categories of users.
6. Confer with former information system users.
7. Formulate questions.
8. Align the user vocabulary with the system vocabulary.
9. Align information needs and system capability.
10. Benefit-Cost review.
11. Select system.

Group 2

1. User identifies information needed.
2. Define objectives and scope of information need.
3. Locate potential information source.
4. User then receives recommendations and information
5. Reiterate if necessary.

Group 3

The user needs to consult an information specialist, a person knowledgeable in sorting through sources.

Question 3 - HOW CAN AN INDIVIDUAL GET THE MOST OUT OF A SYSTEM OR SERVICE TO FIT HIS OR HER NEEDS?

Group 1

1. Work closely with an information specialist.
2. Define your needs accurately.
3. Educate yourself about availability, capability structure and utilization of system.
4. Acclimate users to computer technology.
5. Understand use of keywords.
6. Test - operate the system.
7. Refine questions.
8. Produce computer printout on standard-size (8½ x 11) paper.

Group 2

1. Personal contact with information specialist
2. Feedback and interaction with the system developers, operators and maintainers.
3. Acquire desired information.

Group-3

Group recorded the question as: How should a service be constructed to best users' needs?

1. A computerized data base with a clear, well - organized index would be most desirable.
2. Data base must be kept up-to-date. Service should be on-going.
3. An information specialist should be responsible for disseminating information, drawing from his "information referral experience."
4. This system, if computerized, should be accessible through the information specialist first-hand or via telephone network.

Question 4

WHAT TYPES OF INFORMATION SHOULDN'T YOU EXPECT
TO GET FROM A SYSTEM OR A SERVICE?

Group 1

1. Analytical Interpretation
2. No Data (specifics); Store is exception
- 3.
4. Solutions
5. Better information than what was entered
6. All the information you need
7. Generally: Not more than a reference service

Group 2

You can't expect to retrieve current unpublished information.

Group 3

No single centralized system or source can fit all needs or store all data.

Question 5 - HOW CAN YOU OBTAIN THE INFORMATION YOU ARE UNABLE
OBTAIN FROM THE SERVICE OR SYSTEM?

Group 1

The following groups and resources can be consulted. This list has been prioritized in terms of probably benefits for the expended.

First Priority

Consult Experts
Ask Librarians
Consult Directores of Federal
and State Agencies and Laboratories
Current Publications
Bibliographies
Site Investigation

Third Priority

Interview Authors
Industries
Local Municipalities
Special Interest
Groups (Proponent and
Opponent)
Maps
Chambers of Commerce

Second Priority

Universities: Libraries, Department
Heads, Professors
Federal and State Agencies and
Laboratories
Directories of Current Research Projects
Special Library's Directories
Professional Societies
Technical Societies
Annual Reports and Budgets (both Public
and Private)
Project Reports
Business and Industry Associations'
Directories
Attend or Review Proceedings of
Conferences, Symposiums, etc.

Fourth Priority

Local Residents
Remote Sensing
Footnotes
Requests for Proposals
Professional Papers Published

Fifth Priority

Personal Investigation
Test
Research

Group 2

Make personal contact with a knowledgeable person. If possible and necessary, go for original research funding.

Question 5 (Continued)

Group 3

Sources other than information services:

1. Personal Contacts - professionals
2. Publications - a) technical, professional journals
b) directories of professionals and institutions
c) personal libraries, specialized collections
3. Library and Interlibrary Facilities and Tools
4. Initiate Research, Survey
5. Feedback from Reviewers of Reports
6. "Steal Ideas" - RFP's, proposals

Use of these sources is based on experience with sources, general scanning, a building index - working knowledge with future data needs in mind, preparedness; constantly looking for additional sources.

"Shopping List" of sources:

"White Paper" - floating ideas in proposals
RFP's, RFQ's
Smithsonian, NTIS - new acquisitions list; NTIS gets published and unpublished reports

Proposals

Agency Data Files - collected for regulation and monitoring
Federal Register
Agency Book Shelves
Remote Sensing Data from NASA, USGS, Universities, National Archives, Corps, State and County Government Agencies, NOAA, Dept. of Defense, etc. (Access is usually indexed).

International Organizations - review paper

EIS's
Conferences-information disseminated, new publications, personal contacts
Libraries-new acquisitions list
Sea Grant, (university)
Special library collections-not widely known or advertised;often not available to the public
Small subject computer data banks
Other people, organizations involved in same topic
(a source of leads)
Informal networks, "invisible university"
Special Symposiums, workshops
Dissertations
Institutional list of publications

Group 4

If you have utilized a system and the information specialist, you can assume that this information your'e looking for doesn't exist.

Question 6

HOW CAN YOU GET INFORMATION INTO A SYSTEM CORRECTLY
OR HOW CAN YOU ESTABLISH SOME DEGREE OF QUALITY CONTROL

Group 1

Input Correctly

First Priority:

Check with Researchers (Verification)
Employ a High Quality Staff

Second Priority:

Care in Entree
Check Entrees
Follow-up Process
Check Abstracts
Edit Abstracts

Quality Control

First Priority:

Establish Quality Control Procedures
Motivation for High Quality
(i) Private Profit
(ii) Public User Needs
Employ a High Quality Staff

Second Priority:

Utilize a Panel of Experts
Screen the Material
Standardize Format
Include Methodology

Third Priority:

Set Standards
Educate Research on the Correct Use of
the System
Establish some Standardization among
the various Information Systems

Group 2

The source of information must verify data inputs and allow public/peer review.

Group 3

Observations:

- A. Evaluating Information Received
 1. Time and cost is a constraint
 2. Too much time spent collecting data and not enough time evaluating it
 3. Quality screening of information
 - a. Task orientation
 - b. Professional background
 - c. Method of making decisions (personal style or institution's style)
 - d. Screening and rescreening by different disciplines
 4. Feedback from users

Question 6, Group 3 (Continued)

B. How to Use Library - Nonconventional Uses

1. Frequency of staff use.
 2. Frequency of outside requests for your reports, indicator of real value.
 3. Circulation lists of reports, new acquisitions, Table of contents journals, etc.
 4. Barrier to access, e.g. several people using same materials.
 5. Staff may not have time to adequately use the services.
-
1. Reputation of source (information source, researcher, institution).
 2. Personal Contacts
 3. How data was collected: instruments, method of sampling, analyses, design of sampling technique.
 4. Experience
 5. Amount of documentation
 6. Comparative analysis

Group 4

Systems are only as good as the person who inputs the information. The key here is the person inputting information must assume responsibility for doing it correctly. Qualification statements or "riders" should be added to the information statements. It is the responsibility of the user to evaluate the information in a given system.

Question 7

WHAT DO YOU FEEL ARE THE EMERGING TRENDS IN ENVIRONMENTAL
INFORMATION ABOUT LAKE MICHIGAN?

Group 1

Priorities

1. Environmental Health (Human Ecology)
2. Applied Research
Increased Accountabilities
More Precise and Detailed Measurements
Realization of Geographical and Temporal Specificity
of Data
3. A more Educated Public
Greater Appreciation of Ecological Interrelationships
Changes in Public Attitudes and Behavior as a Result of
Increased Information (Conservation Ethic)
4. Increased Interagency Cooperation
Increased Intersector Cooperation (Industry-Public)
A Regional Conception of Problems
Increased International Cooperation

Group 2

1. Ever increasing volume of information
2. Increasing costs to deal with this information
3. Data and information will be collected on an interdisciplinary basis
4. New types of information will emerge as will new ways of storing it.
5. Impetus to coordinate various data collectors will emerge
(Referral Systems: who is collecting what and why?)
 - (i) Must question the validity of establishing central data bank
 - (ii) Double work required

Question 7, Group 3 (Continued)

6. Recommended are annual conferences to exchange information, e.g. "Planning and Management on the Great Lakes."
7. Networking should be used instead of a central data bank.
8. New research skills are needed due to data collection and storage methods.
9. Remote Sensing will be used in combination with ground truth to extent and calibrate data.
10. Follow-ups on EIS's showing actual impacts.
11. More sociological data and information will be available.
12. Information systems will be formed to deliver technical information to the public for the purpose of evaluation of government agencies.
13. Public Service Information - fish forecasts, weather, etc.
14. Great Lakes (previously neglected) will be looked as a unique area utilizing unique approaches and techniques.

Additional Thoughts:

There now exist many gaps in Great Lakes research. Little money is going into Great Lakes research. Additional forums for exchange are needed. OMB will sponsor hearings on how to allocate research dollars to Great Lakes states. A more important target or goal is needed to attract more groups or entities. Lake by lake, Governors' conferences on information exchange could be undertaken.

Question 7 (Continued)

Group 4

1. More information will be produced; therefore, more confusion will exist.
2. With the rising costs of gathering data, pressure will be on the generators to disseminate their information or see that it gets sent to someone who will maintain it.
3. Technological advances will warrant more, detailed information. This new detailed information will continually update data files/banks.
4. Litigation will continue. Legal decisions will become important sources of information.
5. More people are being involved in the planning process. This will continue with an expansion of user groups and needs.

Group 5

Water Pollution	Awareness of increasing complexity resulting from improved technology.
Water Use	Increased attention to diversion.
Water Law	Increase the use of litigation as a form of resolving use conflicts.
Public Involvement	Increased sophistication of citizen participants and public interest groups, (asking harder questions requiring direct understandable answers.
Public Agency Openness Wageregate Fallout	Public agencies feel greater responsibility to supply information to their public.
New Technology in Data Collection and Storage	Positive Aspects - Serves researchers Improved bibliographic and data inventories Negative Aspects - Too much information Increased expertise is needed to get access
Applied Research	Cross professional/role translators

Group 5 - NOTES IN GENERAL

Limitations of Bibliographic Computer Systems:

1. Timing
2. Poor Key Words
3. Difficult to get document listed
4. Self-serving Quality

Data Oriented Computer Systems (e.g. Water Quality, Biology):

These systems are valuable for the technical user only, over a broad geographical area. One of the problems is getting the data into the system. Another is the designations or relevant parameters. Generally parameters are limited in these systems. There exists a need for a homogenous user group.

Creation of New Systems to meet the needs of a particular study:

1. Arises due to lack of flexibility of existing systems
2. Added effort is needed to adapt to existing data
3. Practical difficulties exist in adding new types of information to existing system
4. The quality and type of information can be controlled

Selecting a System:

1. A "Broker" of Systems is needed
 - A. Information Specialists
 - B. Librarians
 - C. Research Centers
2. Where/how do you find brokers?
 - A. University Libraries
 - B. Federal Agency Libraries
 - C. Professional Network
 - (i) Personal contacts (grey material, time factor, quality control)
 - D. Information Disseminators - people interested "by instinct" in communicating information
3. Others ways
 - A. Newsletter - there's a good way to sort out newsletters to discover the good ones
 - B. Sampling View points, e.g., industry, affected party, environmental groups, university research, government regulators.

Group 5 - NOTES IN GENERAL (Continued)

Users of Information:

Pure Researcher
Applied Researcher
Program Manager

Planner
Legislators - Federal and State
"The Public"

Special Problems -	1.	New "Buzz" words
With Information	2.	Lake of time
Systems	3.	In-agency data

How does one set up new Information Services?

1. Improve the "brokerage," both the user and supplier. Identify research needs for agencies doing planning or regulating as a result of inquiries.
2. Focus on: People, phones, travel, xerox, cross-collection information, conferences, information hot-line ideas, "feel" for information, and agencies, unpublished reports (information).

Recommendations: Encourage the development of brokerage services involving both the suppliers and users of information. Such a service would train the users to find information themselves.

APPENDIX B

FEEDBACK

The following are responses to two questions posed to the participants during the first day of the symposium.

Question 1

WHAT PROBLEMS HAVE YOU ENCOUNTERED IN ATTEMPTING TO LOCATE INFORMATION ABOUT LAKE MICHIGAN?

Information on the biological water quality of Lake Michigan available at the IIEQ Information Center, has met pretty much satisfactorily the needs of the users. However, the Center has had trouble finding information on - who are the polluters, the kinds and their quantity of pollutants those polluters generate, the government's regulatory actions controlling those polluters. Also, there is scarcity of information on the studies on the quality of the drinking water drawn from Lake Michigan.

Obtaining the latest and most up-to-date statistical information on diverse subjects.

Information is widely scattered and requires a great deal of effort to get. In many instances, the information is not available. If the information is in the form of data, it usually is impossible to judge its quality unless methodology is included.

Lack of knowledge about the sources of information.

Some confusion about the various organizations' structures and how they interrelate.

A lot of information on the Great Lakes is included in publications but not indexed separately. Hard to access.

Problem in translating user request to the vocabulary needed to access materials they are looking for.

Although a vast amount of information can be readily found to fully address a given question, I feel I want to see all of the available information. With so many known (and unknown) agencies and people working in the area, I feel somewhat uncomfortable that I have found all of the sources on a particular subject. I would like to see a central library or referral service that would facilitate my information gathering.

Finding out who has information on the regional resources.

In designing rigid lake front structures such as piers, groins and bulkheads, very little up to date information is available on wave action, such as significant wave lengths and wave heights as well as wave pressure due to high waves in the Chicago area. In addition little or no data is available on wave forces and ice action on floating boat slips. Recently floating tire breakwaters are beginning to be used with the only information available coming from tire companies. The tire company reports all indicate the floating tire breakwaters are a success. However, some have failed. It would be helpful if all of these locations were identified and reports from owners submitted on condition of breakwaters after a few years. Also what information is available at locations where floating tire breakwaters and floating boat slips were allowed to remain in the Great Lakes area over a winter.

Lack of site - specific information - to disseminate to reparians and local governments.

That data collected by agencies, industries, etc. are often not comparable and are not reported to a centralized location.

Lack of an adequate data base for pesticide information of Lake Michigan fish.

I need summarizations in fields, not every itsy-bitsy technical research study ever done. There are very few current summaries or review papers in areas I've researched thus far.

Information had to be sought at scattered sources which appear to have little lateral liaison among them.

Significant data gap in areas of physical environment of the Lakes. Lake environment is unique in itself, as distinct from ocean-coastal environment, hence requires local monitoring.

Diversity of sources. Little knowledge of what is available from who. Reluctance of the sources to release information.

Data quality - laboratory analysis. Useful data in machine readable form.

Question 2

AS A POTENTIAL USER OR PRODUCER OF INFORMATION ABOUT LAKE MICHIGAN, WHAT ARE YOUR PERCEPTIONS OF NEEDS FOR IMPROVED ACCESSIBILITY TO LAKE-RELATED DATA AND INFORMATION

There should be comprehensive indexes and abstracts on Lake Michigan, in book form or machine readable.

Though I am responsible for the production of information, I seldom am approached by users. I believe this is due to a lack of communication. What is needed is a who's who list of information and data producers for Lake Michigan. The list should include a listing of those fields the producer is knowledgeable in. A similar list could be compiled of users; containing information on responsibilities.

Get access to unpublished materials. Work more closely with librarians. Track down "fugitive" material - uncataloged materials, especially old government documents. Knowing "who" to contact for certain materials.

Better communication or more dialog between the information users and information specialists.

More concerted effort on the part of the administrators and researchers in the area to disseminate information about their publications and their research.

More of an effort needs to be made to get document and report materials into established information centers and services.

Perhaps a periodic listing of publications. Sources of data that are collected on a continuing basis.

There ought to be a central source of information which serves both as a referral and clearing point. A mission-oriented outfit funded by CZM money located at either Chicago or Detroit would have the best chance of success and practical use.

Two suggestions have developed:

1. Encouragement of state-of-the-art reviews directed toward specific classes of users.
2. Development- and necessary periodic revision of a catalog of persons with knowledge of one or more aspects of the area of the lake under discussion.

A central computerized retrieval information service would be very beneficial. The engineering center should preferably be located in the Chicago area.

It should be possible for an agency like mine to make a contractual agreement with a University Library for specified library research projects. We are a distance from the library; it is uneconomic of our time to travel there. It used to be beneficial to have the library expert spend time on our behalf to answer the question "What do we have in our library that might utilize this client's knowledge and serve his information needs?"

A central directory of the material (general areas of study) which is available from the multitude of sources.

A study or project that will identify those groups, agencies, industry, etc. which are major suppliers and stockers of Lake Michigan data, including conclusions and/or recommendations for making data comparable and accessible to users. Hopefully this study will be initiated under a contract from IIEQ this coming fiscal year.

As my involvement becomes deeper in certain areas; more acute, and specific information is needed and produced, I would like to see a regionalized data bank. STORET attempts to do this, although I feel many agencies (like mine) and institutions cannot or do not utilize this avenue. Unpublished information is the biggest problem as it can be extensive. Data quality is often unknown to the user. I would like to see a mandate to address this problem to all people working, gathering data in a given area, regardless of their background.

The more common Data Bases should be made known to the user (along with the person's name to contact) so that he/she will be able to contact the persons in charge of the bases for data requested.

Central clearing house for particular needs.

ATTENDEES

LAKE MICHIGAN INFORMATION SYMPOSIUM

Barbara J. Arnold
NRERC
Steenbock Memorial Library
550 Babcock Drive
Madison, Wisconsin 53706

George Benda
5728 S. Drexel #2
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